Nature Magazine

VOLUME 43 NUMBER 10

DECEMBER, 1950

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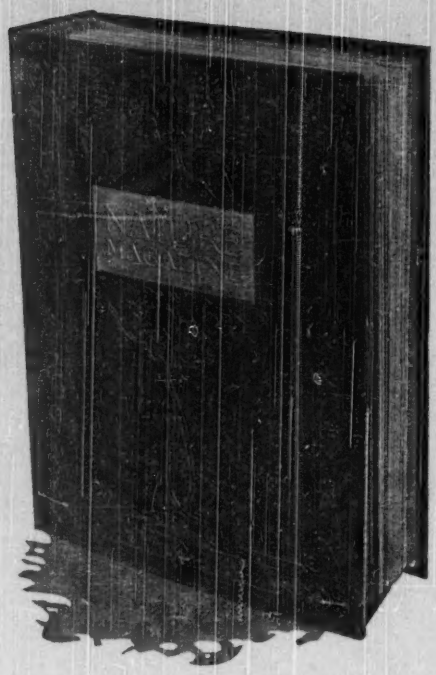

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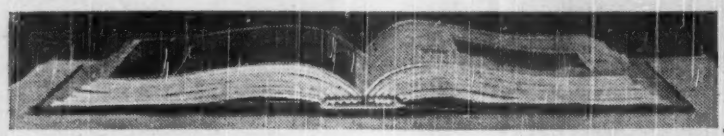

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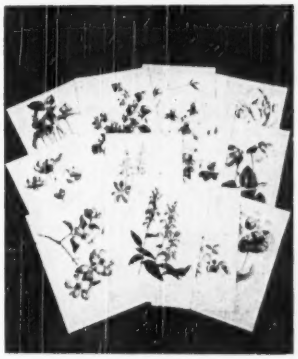

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Nature in Print

By HOWARD ZAHNISER

THE secret of Francis of Assisi, observes Donald Culross Peattie — "the core of his soul, the pith of his gospel" — is gratitude, "gratitude for the gift of life with all its sweet experiences."

Over and over again last Monday, on that somber September 11, this thought — this interpretation of Mr. Peattie's in his newly published *A Cup of Sky* — pulsated in my consciousness as I sat in the seat of Lower 1 in Car 312 and reread and pondered this small volume and, with it, *Saint Francis of Assisi: A Biography by Omer Englebert.*

As I thought of the December magazine in which these books would be considered by the readers of this page, of the cozy, intimate, generous season of Christmas which December connotes, it seemed exquisitely fitting that St. Francis — the saint of both Protestant and Catholic, of Saracen and sceptic, even — should be deeply in mind. This simple great man of strength and sweetness, who (after the mystic change that interrupted the wild revels in which he was the "king of misrule" for the young men of Assisi) became the Christian universally celebrated as "the most perfect imitation of Jesus" — this joyous sufferer who faced the agonies of himself as well as others without losing his delight in life — seems with Jesus of Nazareth a most proper minister in the Christmas meditations that always have some part in even the distracting holidays that we make of this season.

Christmas, a time when we are merry ourselves yet compassionate in thought and generosity with those who are not so, and in our compassion still merry — a time when in the coziness and contentment of home we are warm yet mindful of fellow men, and of creatures of the wild, too, who are cold and hungry, mindful but not mournful — a time when we are in poignant remembrance of those we have known from whom life has gone, yet nonetheless in a spirit of abounding vitality celebrating the triumph of life over winter — Christmas is indeed a time when Francis of Assisi can come to our minds as a companion in all fitness.

The story of his life, as Omer Englebert says in this detailed biography, which Edward Hutton has translated and edited for us, "is a pathetic and charming story," and one truly finds it so, expressing in the reality of a human life the essence of the charm and the pathos, too, of our living. So it seemed on that long day last Monday in the Pullman. So it seems this Sabbath morning as the sun rises again. So I know it will seem in the Christmas season toward which these thoughts are sent.

Abbé Engelbert observes that where Francis of Assisi "is indeed without a rival is in the faculty of loving, the gift of love." "Francis," the Abbé writes in a most sensitive, expressive paragraph, "is one of those men of whom humanity will always be proud. His qualities compel sympathy, his defects, if he has any, are seductive; his sanctity has nothing esoteric or effeminate or intimidating; his natural gifts rouse general admiration; his teaching has so much freshness, so much poetry and serenity that even the most blase can find there reasons to love life and to believe in divine goodness. He attracts all by his nobility, his disinterestedness, his goodness."

It is, of course, the interest of Francis in the world of Nature, rather than his saintliness, that brings his name to this page, yet it seems that perhaps it is all one, after all, that the quality of his interest in his fellow creatures — an interest that can well be emulated — is the quality of his whole saintly life. Abbé Englebert perceives that Francis "seizes on the hidden relations of things," and in the terms of his own religious persuasions the Abbé relates the interdependence of all our living that Francis seemed to sense intuitively.

"One of his merits," writes the Abbé, "is to have given speech to the fraternal voices, so long silent, of the creation. He awakes these, which were asleep. The unity of God's plan is discovered to his eyes; contemplating nature with that freshness of vision with which the first man saw it on the first morning of the world, he finds there again the traces of divine tenderness and beauty; he loves plants, animals and forces the elements to unite themselves with him to praise their common Benefactor."

It is among the values of this new, comprehensive biography that it gathers the details of the legends and lore, the accounts and elaborations, of the experiences of St. Francis with the birds and other wild creatures and carefully presents them — in the setting sanctioned by the Church, yet with scholarly regard for the exact description of the nature of the authorities cited, "persuaded," as the Abbé writes, "that once in possession of authentic evidence the reader will, without difficulty, draw from it what is best worth having."

The Abbé presents in full the sermon that Francis addressed to the birds at Pian d'Arca along his way from Cannara towards Bevagna (and has since preached again and again in print to many of us). It is "one of the most beautiful that has ever been preached here below," says the Abbé, and he follows this comment with a keenly apt characterization of St. Francis and his regard for the wildlings he called his brothers and sisters:

" 'He called the dumb animals, however small, by the name of brother and sister, because he recognized in them the same origin as in himself,' says St. Bonaventura. There is a relationship between men and beasts, plants, the sea and the stars," continues the Abbé Englebert. "And in fact," he asks, "is it not to have a very meagre view of the world not to realize the bonds which unite all creatures to one another and then to God? Did not Jesus himself evoke the goodness with which the Heavenly Father nourished the sparrows and the lily of the field arrayed as was not Solomon in all his glory? And before the Fall, man, the animals, and the elements, were they not friendly together? At all events," says the Abbé, "everyone in the West expresses and feels like St. Francis, this sentiment of the universal fraternity of all created things. His heart was like that of Adam in Eden, so that the

Il Cantico di Frate Sole

By FRANCIS OF ASSISI

Translated by Matthew Arnold

O most high almighty good Lord God to Thee belong praise, glory, honour and all blessing!

Praised be my Lord God with all His creatures, and especially our Brother the Sun, who brings us the day, and who brings us the light: fair is he and shining with a very great splendour, O Lord, he signifieth to us Thee!

Praised be my Lord for our Sister the Moon and for the Stars, the which He hath set clear and lovely in heaven.

Praised be my Lord for our Brother the Wind and for air and cloud, calms and all weather, by the which Thou upholdest in life all creatures.

Praised be my Lord for our Sister Water who is very serviceable unto us and humble and precious and clean.

Praised be my Lord for our Brother Fire, through whom Thou givest us light in the darkness: and he is bright and pleasant and very mighty and strong.

Praised be my Lord for our Mother the Earth, the which doth sustain us and keep us and bringeth forth divers fruits and flowers of many colours and grass.

Praise ye and bless ye the Lord and give thanks unto Him and serve Him with great humility.

beasts perceive it and always show themselves grateful for the honour he did them."

The supreme expression of the Franciscan joy and praise and sense of fellowship with all life — indeed with all the universe — is, of course, in St. Francis's own sublime "Canticle of Our Brother the Sun." This the Abbé quotes in full, and of it he relates its origin in the hut at San Damiano where St. Francis — stayed in a journey by painful illness — was so plagued with mice, which even "ran over his face squeaking and whining," that he "cried aloud to God," yet — comforted — composed the gentle and magnificent, simple and grand poetry of this majestic "Hymn to Creation," as Mr. Peattie entitles it. "Il Cantico di Frate Sole" it is in Italian.

Around his own professed homage to St. Francis Mr. Peattie has gathered together the essays that comprise this book he calls *A Cup of Sky*. Its introductory essay is biographical, of St. Francis, culminating in the quotation in full of the "Hymn to Creation" — in the same eloquent translation by Matthew Arnold which Edward Hutton also uses to convey to English readers its complete quotation by the Abbé Englebert.

There follow, then, brief essays on "Sunlight," on "Wind," "Water," "Hearthfires," "Snow," and "Butterflies" — each an elaboration of a phrase from St. Francis's hymn of praise. In the same style and tone, though without further reference to St. Francis, the remaining chapters of this small volume — "each no more than the filling of a shallow basin, for quick drinkers at the brim" — are further miniature essays on "Birdsong," "Shooting Stars," "Bread," "Pollen," "Honey," "Spider Silk," "Hummingbirds," "Ferns," "The Evening Planet," "Fireflies," "Bats," "The Moon," and "Our Heavenly Earth." In several of these Mr. Peattie writes along with his seventeen-year-old son Noel, and in some chapters Mr. Peattie speaks entirely through his son, whose special interest is in astronomy but whose voice is the voice of his father as it sounds in the smooth phrase and deft combination of fact and personal emotion which readers have long enjoyed in Mr. Peattie's writings. This is not so much nature writing to convey information, but rather the literary expression of personality as affected by thoughts of nature, in the form of the informal or intimate essay to charm and edify, if it please. Once again it seems that Mr. Peattie in essence writes not so much about the subjects in his titles, but of himself, artist as he is — concerned not so much with knowledge as with expression. So it is that we witness another testimony to the pervasive influence that lives on from St. Francis into so many various lives.

"The heart of my garden," says Mr. Peattie in a foreword, "is encircled by tall evergreens; a path runs under the pine boughs, and in the center of this small enclosed green place is an ivied column of stones with a basin on it for the birds to drink from. At the basin's rim stands a little Saint Francis, blessing the thirsty at its feet.

"So it is Saint Francis who is at the heart of my garden. Every morning when I come to walk here before going to my desk, I fill the basin with fresh water for the birds. There is no more ritual than that in any of my worship. But, in a humble and modern-minded fashion, I am by belief a sort of Franciscan. At least, I am reverent where he was, and that is before all that is great and lasting, all that is little and beautiful, in Nature. In his shining goodness and innocence he hymned sun and wind, fire and water, all that grows on earth, and the moon and stars."

What Providence it was that led me to put these two books — this Peattie volume and this biography of St. Francis — in the suitcase as I left on that train journey a week ago, I do not know. For I had already read both in full, and the journey expected was but overnight to a long day at meetings in Columbus, Ohio, and overnight back that same day. But a gracious Providence it was, for the companionship that day of the spirit of St. Francis was sustenance indeed. The gratitude "for the gift of life with all its sweet experiences," which Mr. Peattie felt as the secret of St. Francis, springs, as Mr. Peattie wrote, "to any heart in moments of happiness; it welled from the heart of the saint even in agony." So it was that on the ill-fated *Spirit of St. Louis* I reread and pondered this as we withdrew from the agony of that ghastly crash of September 11 with its death and disaster, and through a long day made our solemn way by detour to our destination ten hours later.

Through a sober week that agony has lived on in consciousness, but with it a spirit of gratitude for life, touched with compassion for its suffering and for those who suffer, yet joyous too in the sweet fashion of St. Francis. And even for those whose suffering is exquisitely intense there wells up still the deep wish for a Christmas merry and joyous, however poignant, with a bounding love toward all life. Such is the Christmas-like ministry of St. Francis of Assisi that still reaches out, and glad I am to share it, with beast and bird and every creature, and indeed with all the readers I can gather about this page.

Saint Francis of Assisi: A Biography by Omer Englebert. Translated and edited by Edward Hutton. New York: Longmans, Green and Co. 1950. 352 pp. (5½ by 8¾ in.), with reproductions of 17 paintings on 17 plates; chronology of the life of St. Francis; appendices on sources of the life of St. Francis; English studies of the sources and English works and translations, bibliography, and index. $4.

A Cup of Sky. By Donald Culross Peattie and Noel Peattie. Boston: Houghton Mifflin Company. 1950. 242 pp. (5½ by 8⅜), with 20 drawings and cover design by Lynd Ward. $2.50.

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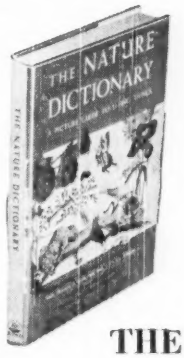

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Illustrated by Samuel Nisenson
Introduction by M. M. Brooks, Director of Nature Education, New York City Board of Education

THE FAMILIAR ASPECTS and little-known fascinating details about the world of nature are all revealed in this wonderful book for both children and adults. Its comprehensive definitions and references will easily answer the myriad questions which so often arise about nature science. Its colorful illustrations make it a perfect gift book for children of all ages. Here are thousands of absorbing facts about birds, animals, fish, insects, flowers, trees and butterflies — each descriptive definition accompanied by a large illustration in full color — 500 in all. This stimulating, informative and beautiful volume should be in every home, school and library.

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To Stimulate Public Interest in Every Phase of Nature and the Out-Of-Doors, and Devoted to the Practical Conservation of the Great Natural Resources of America

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SPARROW HAWK BANDING

By Emerson A. Stoner

Photograph by Marjorie Stoner

THE project now well known as "bird-banding" is sometimes simply routine — catching a few linnets or crowned sparrows, placing bands on new birds captured, recording the dates banded or recaptured, with band numbers, and other data. Sometimes, however, a bander may have thrilling and exciting experiences.

The picture accompanying is of a sparrow hawk captured in a manner not listed in bird-banding manuals. My daughter, Marjorie, is a student in the University of California. When she is home from college she keeps her eye on my traps, retrieves what birds get caught and places them in a small gathering cage awaiting banding later in the day. On February 2, 1950, she rushed to the aid of a golden-crowned sparrow, which a sparrow hawk was endeavoring to capture through the bars of one of the banding traps. An accumulation of sparrow feathers at the trap confirmed the suspicion that the sparrow had been injured by the hawk, although the smaller bird was still much alive. After caring for the sparrow as best she could, Marjorie contrived some way of capturing the hawk.

I was proud of the manner in which she planned the capture, as she described to me in an excited phone call to my office shortly thereafter. She had looked through my drawer of scientific bird skins, picked out a Cassin's purple finch and placed the skin on the floor of the banding trap. In a few minutes the hawk returned, perched for two or three minutes on a pole supporting our berry bushes and eyed the bird skin; then curiosity, and probably hunger, prompted him to enter the trap. A trip of the lever and she had him!

The golden-crowned sparrow died. It had been first banded on April 1, 1947, returned on February 29, 1948, and the capture on February 2, 1950, was only the third time it had been in our traps — not a happy reception after the rather long absence.

As for "our" hawk, what should we do with him. If released he might kill more of our birds. Our household unanimously agreed that killing him was out of the question, as he was only acting as Nature's law provided in securing his livelihood. So, after the banding, he was taken some distance from our home and released, in the hope that in the future he would capture such items as large insects, crickets and grasshoppers, which are his more common items of subsistence.

Antarctic Colony

Should you be interested in staking out a claim to a bit of Antarctica, and settling down in this frigid land as a pioneer, you should get in touch with Antartic (sic.) Colony Associates. According to a release, which, incidentally, largely misspells the name of the region with which the group is concerned, the Associates are "a small group of individuals interested in solving the problems and in developing the techniques that will enable them to construct self-supporting colonies in the Antarctic Continent." The group seeks to bring together the explorer-pioneer and the scientist-engineer to "accept the challenge that comes blasting out of the high South." So far as we can discover, by a careful search through the announcement, headquarters of Antartic Colony Associates is 541 Rast Street, Jacksonville, Florida.

Water and Man

Water and Man: A Study in Ecology. Compiled and edited by Johnathan Froman and Ollie E. Fink. Columbus, Ohio. 1950. Friends of the Land. 407 pages. Illustrated. $4.00.

Between the covers of this book the editors have gathered material by a considerable company of authors on the relationship of water to man. As Paul Sears says in a foreword:

"No phase of our environment registers disruption more sensitively than the water cycle. No phase affects human welfare more directly and profoundly. Across the land, from Los Angeles to Manhattan, on farms and in villages as well in great metropolitan centers, there is insistent concern over the growing thirst of our civilization, the thirsts of men and beasts, of field and foundry."

The chapters that have been gathered together are concerned with these thirsts, and the vital problem of satisfying them. While each chapter stands much by itself, continuity of thought is attained through the basic theme that runs through the whole volume. It is a particularly significant book at this time when the President's committee on water resources is considering the whole problem of water in this country in an endeavor to frame a national water policy. There is vast food for thought in this book for the members of that important committee, and much food for thought for every American.

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BRITISH RAILWAYS

By Way of Report

RECENTLY we received a letter from a member of long standing. We are not certain what might be the general reaction to the suggestion he makes, so we pass his proposal on in the hope that member expression will be forthcoming. This interested member writes:

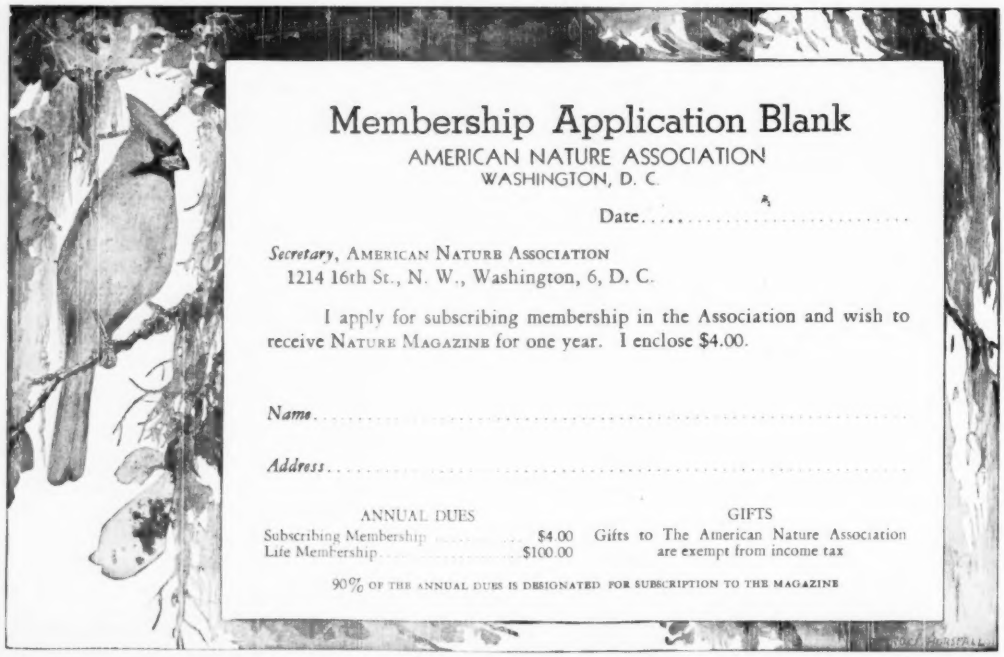
"For the past sixteen years I have been a member of the American Nature Association, both because of a deep interest in its publication and in the Association's objectives and work. Being actively interested in conservation, I have found particularly valuable the conservation articles, editorials and information supplied by the magazine, and occasional separate publications made available by the Association.

"At the same time I have often felt a certain sense of futility at not being able to make my conservation convictions felt in the right places at the right time. I realize that, in a periodical, it is impossible to provide last-minute information on ever-changing conservation issues. I can imagine that the exigencies of press time and such forbid emergency calls for action through the pages of the magazine.

"In view of this I am going to be so bold as to make a suggestion for what it may be worth. Why not establish what might, perhaps, be called a 'Conservation Membership' in the Association. Such a member would be placed on a special list to which would be sent, by special mailings, copies of pertinent current bulletins in the conservation field, and special releases or calls for action. It is my thought that, in this way, an 'action group' within the present membership could be created — a body of actively interested conservation members who would go to work on special emergency issues as they arise. *Nature Magazine* would, of course, provide the basic material, but if quick action were needed with respect to specific legislation, or sudden threats, the conservation members could be thus mobilized.

"I realize that this would mean added expense of time, material and mailing. Personally I would be delighted to become a 'conservation member' at, say, ten dollars a year. I may be wrong, but I believe that there are many others who realize the basic importance of conservation to our individual and collective future and would wish to join with me."

This is an interesting suggestion. We, too, have felt "a certain sense of futility" by reason of the limitations of publication schedules. The Association officers have tried to compensate for this by their own activity, but the expressions of many "in the right places at the right time" would help tremendously. How many others share our conservation-minded member's conviction that a conservation membership, organized and served as he proposes, should be established?



Membership Application Blank

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WASHINGTON, D. C.

Date.....

Secretary, AMERICAN NATURE ASSOCIATION
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Contents Noted

THIRTY-FOUR countries were represented at the Second General Assembly of the International Union for the Protection of Nature held in Brussels, Belgium, from October 18 to 23. In a certain sense, however, this was the *first* General Assembly of this important international force for conservation of species and areas throughout the world. The Assembly held at Fontainebleau, France, in 1948 was mainly devoted to bringing the Union into being, giving it a constitution and charting its future course. In the interim the Union joined with UNESCO to hold the International Technical Conference in the Protection of Nature at Lake Success, New York, in August, 1949. That conference demonstrated the outstanding value of international cooperation and understanding in meeting conservation challenges on a world-wide basis, and the recent Brussels sessions underlined the importance of this approach. We were fortunate to be able to attend the Brussels meeting as an American delegate representing The American Nature Association, The National Parks Association, The Wilderness Society and The Izaak Walton League of America. These notes are written several thousand feet in the air over the Atlantic Ocean and can be only a brief report on some highlights of the Brussels sessions.

IN HIS report as Secretary-General of the Union, Jean-Paul Harroy announced that four governments — Switzerland, Luxemburg, the Netherlands and Belgium — have officially adhered to the Union. The seventy-six founding organizations, including fourteen in the United States, were joined by new conservation groups in a number of countries, bringing the total of supporting organizations to 115. The membership from the United States was increased to eighteen by the approval of four new applications.

AS ALWAYS with international groups, questions of the meaning of words arose. "Nature Protection" is the closest European equivalent of our own word "conservation," and it means protection against unwise and improper exploitation as well as against the abuse of any natural resource. Also, in the European definition, the words "national organization" denote any private organization *within* a nation, rather than a group that is nation-wide in membership and activity. Thus any conservation group, whether, in our sense, of national, state or local scope, is eligible to become a member of the International Union for the Protection of Nature. Other attention was given to the question of nomenclature as it relates to terms and words used to define national parks, reserves, monuments and other reservations. As a means to establishing world-wide understanding of just what is what, a special committee of the Union is to try to clear up confusion in nomenclature, at the same time gathering a wealth of information on reserved areas in all nations.

THE Lake Success meeting a year ago adopted a resolution urging action for the preservation of twenty-seven species of seriously imperiled birds and mammals. Activity in this field centers in the Union's "Survival Service," a term that came in for considerable discussion as being difficult of translation, and therefore difficult to understand, even in English. It was pointed out that the activity is concerned with *survival* of species, and that *service* is being rendered to that end. However, a better term was solicited.

EDUCATION, the basis of continued progress in conservation, was discussed at length. An education commission of the Union, to be headed by Dr. Ira N. Gabrielson, president of The Wildlife Management Institute, was created. Also in the educational field, certain projects being carried out in cooperation with UNESCO were approved, inclusive of a program to provide much-needed teacher and pupil material on conservation for use in the elementary schools of northern Italy. General public education was stressed, also, and a program outlined.

FINANCE is, of course, a problem with most conservation organizations, and the Union is no exception. During the past two years much has been accomplished by the Union on a small budget, and with helpful collaboration by UNESCO. Progress in the coming two years will be measured by available funds. Publication of a report on the world situation — conservationwise — country by country, is already well along. Other needed programs await added funds.

DR. CHARLES J. Bernard of Switzerland was re-elected president of the Union for the coming two years. Harold J. Coolidge, Jr., represents the United States as vice-president and his term runs until 1954. Dr. Roger Heim of France and Herbert Smith of England were elected as the other two vice-presidents. Three new members were elected to the Executive Council — William H. Phelps of Venezuela; Miss Phyllis Barclay-Smith of England; M. C. Bloemers of the Netherlands. Auguste Chevalier and Julian Huxley were elected honorary members. The Assembly voted to accept the invitation of the Government of Venezuela to hold its Third General Assembly in Caracas in 1952.

AFTER six days of intimate association with the program of the Union, and friendly collaboration with the delegates present, we came away with the conviction that the International Union for the Protection of Nature *must* succeed. Preservation of areas and species, and the world-wide spread of conservation consciousness demand such an agency. Organizations in the United States, and the United States Government itself, can contribute much to the Union, and through the Union, and, by the same token, we can derive great benefit for ourselves through this international action.

—R.W.W.

PHOTOGRAPH BY JOHN C. McGREGOR

Drama in Winter

By HARRY ELMORE HURD

A northern shrike, dove-gray and darker gray,
Flashes to my garden, white with snow.
A bird's way is a secretive way —
A way not always for a man to know.

Into the shriveled green of clinging vine,
Casting its shadow on the bordering wall,
The swift bird darts — thus, unbelievably brief
And irrevocably, feathered death may fall.

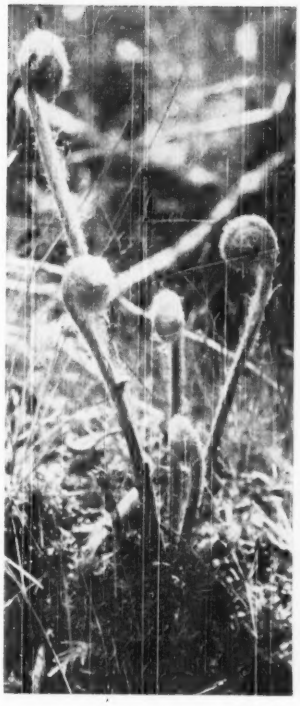
Swifter than sight the bird impales a mole
Upon the rapier sharpness of its bill
While Life erases from its endless scroll
Another squirming victim of the kill.

Glacier's Return

Winter comes to the North, bringing the annual counterpart of the age of ice.

By VIRGINIA S. EIFERT

Photograph by the Author



Spring, and the cinnamon ferns unroll their furry crosiers, and, in early August, the second young osprey in its maiden flight leaves the big nest.

ABOUT one million years ago, say the geologists, there came tremendous moving glaciers out of the North. The ice grew and grew, until it stood more than a mile high over the northeastern and central parts of America, and then began to recede. When after many returns, the ice finally was gone, the country that was left bare held the inerasable mark of the Glacial Era. That mark is visible today in sparkling northern lakes, cranberry bogs, and billions of well-polished, scattered stones.

The glaciers are gone, yet the forests of the north still are at the command of the annual glacier, Winter. It is a time to prepare for and to be ready to meet when it comes.

In the brief period from June to August most wild creatures in the North must bear and rear their young to a maturity able to withstand the coming sub-Arctic winter. Old and young must fatten on all available food, either for strength to hibernate, to migrate, or to live a life of activity in below-zero cold and deep snow. Plants must put forth their entire year's growth in a period of a few weeks, must blossom and make seeds and winter buds to insure the coming year's growth and blossoming. This is all compressed into a growing season whose very brevity is vivid, whose efficient condensation of life and growth hold continual drama. Life is clear and sharp and fast in the North.

By the end of May the snow has melted from the cabin roof and the arbutus is out of bloom, but it is still spring in the North. Now the new leaves of red maple, aspen, and birch are still young and small, translucent and colorful as they expand in the spring sunshine. New growth on the balsams and spruces tips them with silver and pale blue-green; the pines hold unexpanded candles of sheathed new needles; the tamarack needles are still young and soft.

The population of birds has reached its peak. The north country is the goal of countless migrants, which, since February, have been moving up the country in a long flight northward to nest. It is believed by many ornithologists that this annual migration is a carry-over from the pattern set up long ago when the glacial age began. Before the ice came, the North was tropical; with cooling temperatures, the tropical birds were compelled either to die of cold or starvation or move south to lands uninfluenced by the ice. But when the interglacial times came and the land grew warm again, the descendents of those birds moved back, north to their ancestral nesting ground. For some 25,000 years birds that winter in the tropics have flown thousands of miles each spring to the northern woods to nest. Now, in late May, they are all here and song is wonderful. There are sixteen kinds of warblers in the cabin woods, and the hermit thrushes, in carefully spaced flutings, sing from dawn until well past dark. Loons, commuting between lakes, fly crying above the cabin, and purple finches warble in the pine tops.

Every night and morning the bogs and creeks steam with mist.

Here stands a brown cabin. Under it live several families of chipmunks, whose high-strung temperaments keep them in a constant flurry of excitement as they dash about to salvage all the food they can find. Much is put out for them by the summer residents of the cabin and the chipmunks grow very tame. The red squirrels up in the pines scream in a fury, or whip their russet tails to accelerate their rage, cuss and fume and dash about in their private overland route through the trees. Skunks at dusk come to the garbage pit and raccoons leave their tracks after nightly meanderings along the sandy road.

Early June comes, and among the upholstery of creeping snowberry on ancient logs the young fruits are forming among tiny evergreen leaves. There are plump carmine berries on the wintergreen; all winter they have ripened beneath the snow. Bunchberry in white symmetrical blossoms decorates the rosettes of leaves. And the twinflower vines, woven back and forth over path and bank and woods floor, bear delicate pairs of pale pink bells with a faint, wild, northern fragrance. Ground pines in a fine embroidery weave together the mosaic of the woods floor.

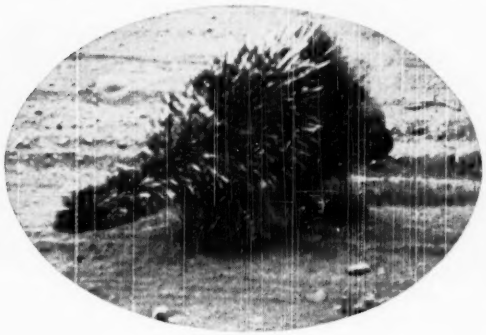
It is June, and wild orchids bloom in the woods and bogs; June, and the muskeg beyond the cabin is wine-pink with the flowers of bog laurel and frivolous with the innumerable snowy puffs of cottony sedge. The bog is margined with the white flowers of aromatic Labrador tea; pitcher plants and sundews blossom in the sphagnum. Cranberries in a fine, thready sequence of vines and small pink flowers ramble over the hummocks of the muskeg.

It is June, and the ospreys have added new sticks to their big nest atop a birch high on the hill, and now they carry fish, held pontoon-wise in their claws, to where probably a young osprey waits. The porcupines rattle their quills along the sandy logging roads, or sit for hours in the aspen trees to chew the juicy bark.

It is June, and from the bracken thickets wobble spotted fawns, knock-kneed and wide-eyed, trailing their mothers. The deer in early June still have their gray winter hair; now they suddenly are red-brown, sleek and well-groomed. They watch from the roadside or woods, fling their white tails in the air and, on steel-spring legs, leap high, with gay insolence, for cover. And as the sound of hoofs vanishes, there sometimes comes a soft, palpitant thudding — a ruffed

The frost burns off the red maple leaves and all day the scarlet leaves drift to the ground.

The chipmunks work overtime garnering every morsel they can find to store under the cabin. They stuff their cheeks until the last prune seed grates on their back teeth. The porcupines rattle their quills along the sandy logging roads, and linger for hours feeding in the aspen trees.



grouse drumming. Soon a nest of newly hatched eggs lies beside a log up in the nearby forest, and a troop of downy young grouse crouch beneath the bracken.

June goes, July comes. The pyrola and pipsissewa blossom beside the deer trail. Ripe wild cherries are eaten by bears and birds. Bunchberries form in tight green clusters. Young birds are out of the nest and soon can take care of themselves; song noticeably decreases. Now the older of the two ospreys grows up and leaves the nest with the younger bird still in it. July goes.

It is August, and now the loons that nested in the marsh are followed as they swim by with one or two gray young. They all dive, swim deeply underwater, come up, and in the opalescent waters of sunset they preen, dip their beaks, and call over and over again in those wild voices of the wilderness.

It is August, and the young deer are tall and leggy and most of them have lost their spots. The bucks' antlers have grown magnificently but still are in the velvet. And the chipmunks around the cabin work overtime garnering every morsel they can find to store under the house. They stuff their cheeks until the last prune seed grates against their back teeth and their eyes are crossed; they look topheavy as they race down the feeding stump and across to the cabin's underpinnings.

At night the flying squirrels clatter on the tin chimneypot and gallop like a troop of elfin cavalry across the roof. And a large yearling black bear in the twilight comes silently and majestically down the ridge to feed in the garbage pit. The porcupines, still eating aspen bark, are not as much in evidence as they were in June.

It is August, and most of the warblers apparently have evaporated. Where there were sixteen kinds nesting here in June, only half a dozen kinds are now to be found, and these with difficulty. All the birds have finished their nesting; the young are grown; they have scattered, are moulting worn feathers and feeding in preparation for the flight south. Some are already on their way. Early in August a hermit thrush sings its last chiming song of the season, and the young osprey rises in its maiden flight.

The quiet of the North grows more pronounced each day as autumn approaches. It is a silence that rings in the ears and presses down on every side; a cosmic silence that is one with the northern lights flaring at night, and the endless quiet ranks of conifers marching toward the Arctic circle. In that silence the smallest sound has importance — a chickadee exploring a pine, the voice of a loon, the rattling of squirrel claws upon a maple trunk.

It is August, time of fruits. The migrant birds eat to gain strength and fat for the flight to Mexico and South America. The chipmunks and bears eat to store fat against the time of hibernation. The annual glacier is coming, and even now, as the days grow shorter and wood fires at night are comfortable in the cabin, the breath of the impending glacial era of winter announces its approach.

Wild red raspberries are ripe; so are blueberries; so are blackberries. And the clusters of scarlet bunchberries are like Christmas decorations in the woods. The *Clintonia* fruits are ultramarine; the baneberries are china-white or firecracker red. And the little snowberries are ripe under the veil of slender vines on the ancient decayed logs, little oval white fruits that are creamy to the taste and subtly flavored with wintergreen. Wintergreen itself is out of bloom, and its new fruits are forming. Indian pipe stands waxen white in the dark hemlock woods.

As August moves toward its end, a scattering of yellow leaves comes inconspicuously among the greenery of the birches. There comes a day when the woods seem full of birds again, as migrants from farther north

pass through. Chickadees in flocks tour the woods. There is a day dedicated to golden-crowned kinglets. And early one morning, when the mists steam off the bog and the bear moves in quiet o gnity past the cabin door and into his own trail in the forest, there may be that loud, resonant "tunk-tunk-tunk" on a dead aspen nearby. Three big pileated woodpeckers, a few feet from the ground, work with powerful strokes on the decayed wood.

One day there is a new sound in the woods. The Canada jays, big and fluffy, gray and white, with black caps, have returned from nesting farther north, to stay here all winter. Quietly they drift along the deer trail; are aloof yet friendly; may come down for a bite of sandwich when a hiker pauses along the trail for refreshment.

One day, almost at the end of August, a red maple suddenly flames pure scarlet against the blue-green balsams. As if frosted, the cinnamon ferns and bracken turn brown. Fireweed fluffs its silky seeds in the wind. In the bogs, the Labrador tea and laurel hold fat buds, which contain the flower buds for next May. And the cranberries are full-sized, although still green, or speckled lightly with red.

Then it is September; it is autumn; the glacier is very near. The nights are cold, and every night and morning the bogs and creeks steam with mist. The summer people go home and many birds follow them south. Hordes of juncos and myrtle warblers feed in the thickets.

Now the trees, following that first red maple, are transformed to something approaching the sublime. The aspens are canary-yellow plumes covering the cut-over country for miles; the birches are pure deep gold against a turquoise sky; the red maples are incomparably pink-scarlet; the clear cadmium, clear orange; clear scarlet of the sugar maples burns everywhere around the lakes. The maple woods bask in an ethereal daffodil light that is almost tangible on one's skin. The colors of the northern autumn are the more startling because of the sharp contrast of the chalk-white birch and aspen trunks, the blue-green of spruces and balsams, the green-black of pines, the sparkle of blue lakes and bluer sky. This is paint country; this is a color chart; this is all undiluted color; a painting all pure pigment.

Cranberries are ripe. Little ruby jewels, they are embedded in or suspended above the sphagnum; catch the light and drop from their thready stems into the moss.

Some time between mid-September and late September the deer change from their summer russets to their winter grays. Their fur is thick and fine, their white "underpants" fluffy. Now the bucks rub the velvet from their antlers and are touchy and aloof; the does and fawns stay together, while the bucks work off the velvet and get themselves worked up into the proper fighting mood.

The grouse in their elegant winter plumage have scattered. The hunting season opens and the booming of guns is thunderous in the silent woods. The grouse grow more wary, but some fall under the hunters' fire.

The loons are silent. In their gray winter dress a few still sit far out on the lakes. Ducks are gathering, and then, above the flaming maple shores of a lake, whose waters are golden, too, and stilly mirrored, the Canada geese come over, flock after flock, day after day. The breath of the glacier is upon them and they have a far way to go to their winter home.

There comes a killing frost. Like a light fall of snow it lies sparkling in the early sunshine and the creek smokes and steams. The frost burns off the red maple leaves and all day they drift to the ground. When a wind blows, the air is full of sparkling yellow confetti as the aspen leaves come whirling down.

A second big frost and most of the aspens and maples and hazels are bare as winter. The red and scarlet oaks turn purple and wine; the sugar maples grow a more tarnished yellow. Now, on an October morning, the tamaracks in the bog stand pale lemon yellow in the welcome Indian summer sunshine.

One night there comes a great storm, with a wind that rips leaves from trees and tumbles the ospreys' nest to the ground. The old birch on which it perched stands bare, except for a porcupine asleep in an upper crotch.

The hardwoods are bare; the conifers are greener than ever; the birds are few; the chipmunks are rarely seen. Then one evening there is a strange, portentous feeling in the cold air and the sky hangs gray and low. When morning comes the world is white and crystalline. The glacier is here. Snow is piled on the spires of balsam and spruce, massed on the pines. It covers the neat evergreen leaves of the snowberry, which has blossomed and fruited, and in its growing season has lengthened its branches half an inch.

The once-brown snowshoe hares are white now and cavort on their big fluffy feet in the snow. The bears are asleep; the well-fed chipmunks slumber beneath the silent cabin. The deer have all gone down to the cedar bogs thirty miles away to yard in for the winter. The red squirrel, discovering the alien presence of the snow, cusses and fumes, and tastes it and spits it out, and leaps clear of it, knocking great gobbets of the white stuff from the hemlock twigs as he heads through the trees to where he has hung up some mushrooms to dry. The annual glacial era is upon him but he refuses to recognize its presence.

And off across the silent miles of snowy forest resounds the lonely "tunk-tunk-tunk" of a pileated woodpecker working on an aspen. The red-breasted nuthatch chitters and skips about in the pines. The porcupines continue to chew bark. Winter has come to the Big Woods. It wraps the cabin with silence and aloneness. Unoccupied now, except for the glass-eyed deer head on the wall, for the slumbering chipmunks beneath the floor, and for a deer mouse in the closet, it will wait until the glacier departs and springtime once again returns to wrap its wintry grasp upon the North.

Have Your Own Hollies

By ANDREW S. WING

"Bountiful," a well-named holly owned by Earle Dilatush, New Jersey holly specialist, has yielded more than one thousand dollars to its owner and is just as bountiful and lovely as ever.

To most people holly is one of the lovely symbols of the Christmas season, but only to be enjoyed for a brief time. Yet most people can have hollies the year around on their home grounds, and if they live below the Mason-Dixon Line, or near it, they can thus enjoy several kinds of holly. In the Pacific Northwest one can revel in the beauty of the true English holly, and it is possible, also, to enjoy at least one or two hollies even if one lives in the lower fringe of northern states. Beside its decorative charm, the U.S. Soil Conservation Service has found that the American holly is a first class tree for holding soil, and that holly-growing offers an opportunity for farmers to make profitable use of land too steep for safe cultivation. Such a soil-saving holly orchard can, a few years after establishment, be clipped conservatively for the Christmas market, year after year.

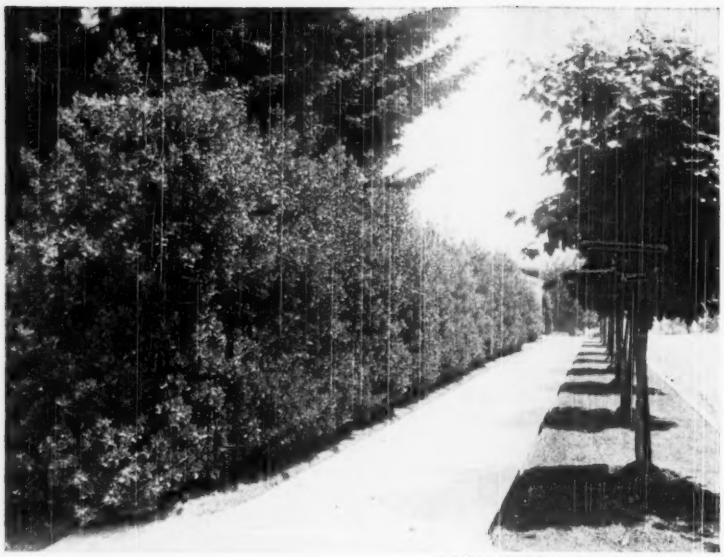
It may well be that you have a holly on your grounds now and do not know it. The inkberry, *Ilex glabra*, is a holly; so is winterberry, one of the most beautiful of our red-berried shrubs, which grows wild throughout the northeastern states and is easily cultivated, although it prefers a rather moist location. One often sees the berries of this holly offered in florist shops and at wayside stands where Christmas greens are sold. Both of these are good shrubs but not evergreen.

But the true holly that most of us know and treasure is *Ilex opaca*, a native of our own eastern states as far north as Massachusetts. In favorable locations this holly will grow to a tree that may be fifty feet or more tall. One may still see many holly trees growing wild in the woods of New Jersey, Maryland and Virginia, although the holly population has been much decimated by the ravages of vandals, who roam the highways and byways in late autumn searching for any plant material that will net them an honest, or dishonest, dollar in the large cities at Christmas time. All the hollies are slow growers, and while it is permissable to prune them discreetly every winter for decorations, commercial vandals mutilate and even destroy trees that have been many years in the growing. The true holly will grow in poor soil, in shade or sun, but it likes best a rather protected spot in thin woods where there is plenty of leaf mold. It is possible to grow one of these trees in your own garden, or grounds, if you do not live too far north and will plant carefully in a protected place in partial shade. The tree must be balled and bagged, and a transplanted tree should be well pruned and most leaves removed. Firms that specialize in the sale of hollies will also supply leaf mold with which to plant and mulch the transplant. Or you can obtain this from the woods. A good substitute would be humus from a compost heap.

My own interest in this interesting plant family goes back twenty years to a visit to a holly farm at Gig Harbor, Washington, on the western side of Puget Sound. The holly business was then undeveloped in that region, which has since become the source of most of the beautiful English holly, *Ilex aquifolium*, sold at Christmas time. At Tacoma I boarded a little ferry boat that landed me near the home of P. H. Peyran, a genial old gentleman who showed me his holly orchard and told me his amazing story.

"Get yourself a little place in the country," he was advised by his doctor, who told Mr. Peyran that he did not have long to live. "Take life easy and enjoy the rest of your days as best you can."

Mr. Peyran, then in his sixties, took the advice, and built a bungalow on a bluff overlooking the blue waters of Puget Sound, with an interesting background of native trees, including some large cedars and other evergreens. It was really a Shangri-la. Mrs. Peyran liked the idea too, although I believe neither of them had ever lived on a farm before. Not wishing to be idle, and hoping to pick up a little income, Mr. Peyran tried chickens, berries, and various other schemes, but without much success in adding to his finances.



PHOTOGRAPH BY J. HORACE McFARLAND

Holly makes a splendid hedge, both dense and beautiful, in areas where it will prosper.

Then a fortunate thing happened. He met a man on the train who told him about holly. He also was lucky in finding a particularly handsome Dutch strain of English holly. There are many varieties of English holly, some better than others, and this was one of the best. At the time of my visit Peyran had about 600 trees on about ten acres of land. The trees were fifteen to twenty feet tall and extremely thrifty and beautiful. For several years he had been clipping about $10 worth of berried holly from each tree, a gross income of about $6000. Best of all, sunshine and outdoor life had brought a complete recovery of Mr. Peyran's health. He and his wife, a charming, motherly soul, were, in their seventies, just about the happiest and most contented couple I ever met. I resolved then and there to have a holly farm some day to retire on back East.

However, I soon learned that holly farming is not as easy as it sounds. I tried Mr. Peyran's strain of English holly in southern Connecticut, and, while it grew, it froze back to the ground every winter and finally died out. It does grow fairly well, however, in certain sheltered parts of New York City and Long Island. So I tried various strains of American holly. They prospered fairly well but I found that the foliage is likely to burn in winter, and the berries do not always form. Although there are some nice trees in the southern Connecticut region, I doubt that a large plantation is feasible unless planted in thin woods.

To have one or two native hollies on a small place, however, is a fairly simple matter. That is, of course, provided you live in a favorable climatic zone. These zones have been changing in recent years, not from climatic changes so much as because of our knowledge of hardiness and how to handle plants. Advice from a local nurseryman, or some other garden expert, should be sought, and, since conditions vary a great deal from place to place, it may pay to do a little experimenting on your own. Also, many hollies require a "mate" to produce berries and this should be checked when buying a holly. There is no reason why almost anyone cannot have a few hollies, or holly-like plants that are evergreen the year around.

My next adventure in the holly kingdom was with the Chinese species, *Ilex cornuta*, called "horned holly" because of the leaf shape, there being three horns in line at the top. These came first from the Office of Plant Introduction in Washington. The leaves of these plants are as glossy as the English holly, have berries, and are handsome, but make a large bush instead of a tree. They are used for hedges on the Pacific Coast, just as our native holly is used for hedges around Washington, D. C. These plants, which were only rooted cuttings, grew well for me at first, and some reached a height of four or five feet. But they all died back to the ground the first severe winter, and, while the roots were not killed, the growth made each year after that was not worthwhile.

Discouraged, but not defeated, I tried again with some small stock obtained from a Japanese nursery in Alabama, one that specialized in fine plants. Here I seemed to hit a jackpot, for at least one plant has proved to be perfectly hardy in Connecticut, and I believe the same strain, or a related variety of *Ilex cornuta*, is hardy as far north as Cape Cod, and perhaps farther. This bush, which is now about fifteen years old, or at least that long in its present location, is more than six feet tall, about as broad and is extremely handsome. The leaves are very glossy, but have few spines. Although in an exposed position near the shore, where strong winter winds blow, there is little burning or dying back in wintertime. As near as I can learn this is either the variety *bufordi*, or perhaps a hardy bud sport of it. It is so outstanding that we intend to propagate it so it can be given wide distribution to friends and other gardeners who love beautiful things.

The propagation of holly is not easy, nor is it too difficult if you know how. It is possible to grow the hollies from seeds, which are borne in the berries — technically called drupes. However, this is a slow and not too

With careful trimming a holly tree will yield annually, yet many wild holly trees are destroyed every year by thoughtless vandals intent only on making a quick and dishonest dollar.

PHOTOGRAPH FROM FRANCIS A. LEIGH

certain process as the seeds are slow to germinate and should be stratified (buried in a cool place over the winter) before they will sprout. Then they do not always come true from seed. Hollies may be started from cuttings of mature wood of the current season's growth taken in the fall, but it must be done under glass where humidity can be controlled, and the process is speeded up if growth hormones are used. A Wardian case, or even a large rectangular gold fish bowl, may be used for this purpose, or for rooting other difficult plants indoors. It is best to use a mixture of sand and peat moss, or humus, or just plain sand. The cuttings should be five to six inches long and most of the leaves should be removed. Keep a cover on the container most of the time, unless there seems to be an excess of moisture, and the case should be in a warm spot with a little bottom heat. A sunny window will do, but not too much direct sunshine, and avoid direct contact with radiators. It may take from a few weeks to a couple of months for the cuttings to root, but be patient and you will get a good set of cuttings if care has been used.

Most people will not care to wait long enough to grow their hollies from seed or cuttings. For them a search through catalogs and visits to nearby nurseries will be a necessary but pleasurable task. There are several firms that make a specialty of these and other unusual plants.

Another handsome holly, which is quite hardy, is *Ilex crenata*, a Japanese species that grows into a small tree, eventually, but can be clipped into an attractive evergreen hedge. The leaves are small, rather like privet, and the habit is less compact than boxwood, which it resembles. It does well in either sun or shade, and is a desirable plant, although it does not much resemble our Christmas hollies. Variety *I. microphylla* is even more compact, with smaller leaves than the type and it is hardier.

It is rather curious that most of the 275 species of holly are natives of the warmer parts of South America. Hence comes the species, *I. paraguariensis*, from which the famous Latin-American drink, maté, is derived. This tropical plant, a native of Paraguay, contains the same caffein that we obtain from coffee and tea. In our own southeastern states grows a wild species formerly used by Indians in religious orgies. This is Cassine or Dahoon, and it grows to be a small tree. Another species native to the same region and sometimes confused with Cassine is *I. vomitoria*.

Inkberry, *Ilex glabra*, is another useful shrub, hardy in the north. It has gray berries but loses its leaves in winter. You would not think of it as a holly to look at it, but it is a good plant in the border, although not as showy as the brilliant winterberry.

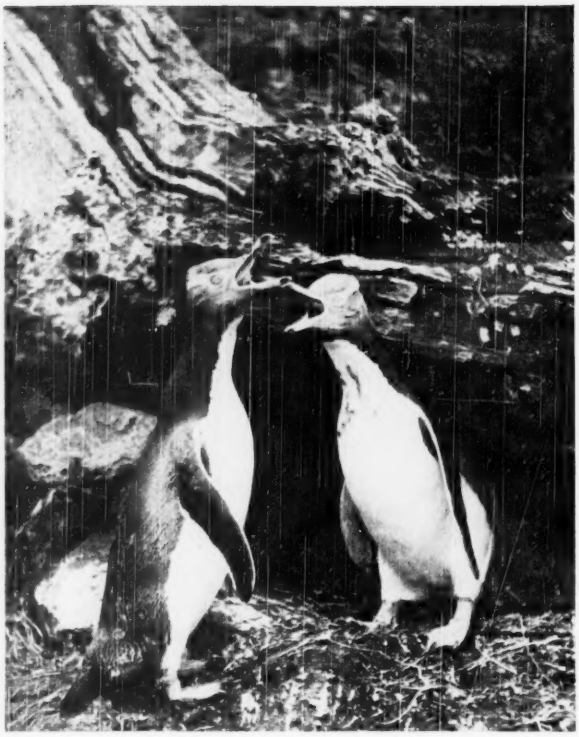
It is the European, or English, holly that has the closest religious and sentimental associations. Although there is only one species, there are 150 or more varieties. It is common in England and the Low Countries. In England it often grows wild and can be found in the woods and hedgerows, as well as in cultivated gardens. From the days of the Druids, holly and mistletoe have been linked with Christmas and with other religious festivals. Tradition tells us that, in Continental Europe, pagan tribes under the rule of Rome sent holly branches to each other as tokens of peace and goodwill, and used them to decorate their dwellings in celebration of "the turning of the sun." Yuletide, the feast of the Celtic sun god, Yaioul, naturally gave way to Christmas with the coming of Christianity, and holly became the "holy tree," the "Christ-thorn," symbolic of the Saviour's crown of thorns.

The wood of the holly is white, dense, and is sometimes used in place of ivory for piano keys, also for engraving blocks. A tall, well-grown holly tree is a thing of beauty when seen on the grounds of an old colonial house in one of the older states such as Maryland, or Virginia, or in the woods. How anyone in his right mind could wilfully destroy or mutilate such a tree is a mystery. It is inspiring to know that the sentiment for holly conservation is growing, and, also, that there are able plantsmen who are specializing in the growth and sale of this interesting family of plants.

★

"Marriage" Among Penguins

By L. E. RICHDALE



PAIR-FORMATION, or "marriage" among birds is a phenomenon that is exercising the minds of many observers all over the world, especially in the northern hemisphere. It is a most intriguing subject and one to which anybody may contribute provided he is willing to do the initial work and wait patiently for results. I have seen the results of the marriage of more than four hundred pairs of penguins during a period of fourteen years of watching, but have never yet witnessed the "ceremony," and I do not think I ever shall. It is not necessary, however, to study some bird on a distant island. Such easily accessible birds as many of the common species around our homes would make excellent subjects. Additional advantages accrue when the bird is near the house. More observations may be made, and time will not be wasted in traveling to more distant fields of operations.

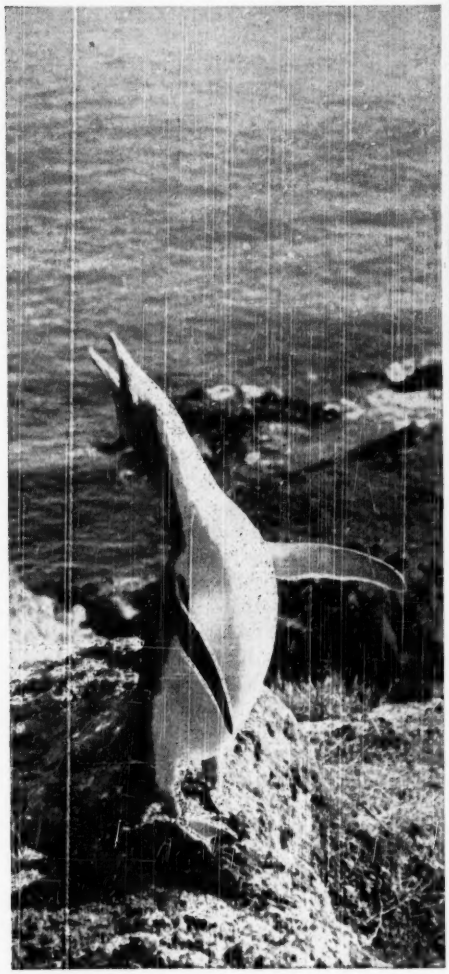
This is not a fishwife argument between two penguins but the sounding of the welcome call as one bird returns to the nest. Below is a unique photograph of two penguins, a photograph that is not likely again to be taken. At left is an erect-crested penguin that has just completed her molt, and, right, a yellow-eyed penguin five days in her molt. These two species are not normally found together.

The methods of bird "marriage" vary considerably. Some species, like the ruff and the blackcock of Europe, meet only for the purpose of mating, so that actually no real pair-bond is formed. Others, as in some ducks, remain together in pairs until the eggs are laid, and then the male abandons the female and the nest. Still others, as with the American house wren, remain paired for the first brood, but may separate and "marry" another individual for the second brood in the same season. Others again, as with many of the small song birds, remain faithful for one season, usually acquiring a new mate in the succeeding season. Last of all, some birds mate for life, as with some ducks and geese and, possibly, the royal albatross, according to my fourteen-year records.

Penguins, or at least the yellow-eyed species with which I have been able to work, do

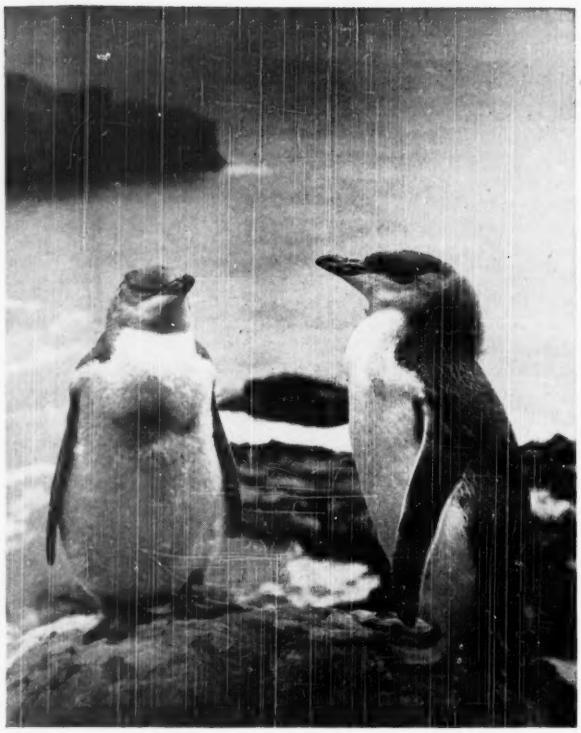
not fit in with any group in these general classifications. With penguins there is a definite element of "divorce," which has an important bearing on the length of time any given pair may remain paired. Of 166 pairs of penguins that have returned in the spring to the breeding grounds where I have been watching, eighteen percent have been "divorced;" these figures indicate, therefore, that "divorce" is not just a chance occurrence. Why "divorce" takes place I do not know, however, and probably I shall never find out.

In spite of this ever-present threat of "divorce," some pairs of penguins remain intact for a long time. For example, one pair, in my field of operations, has been mated for eleven consecutive years, and, in close proximity to them, is another pair whose union has survived for ten years. The female of this latter pair I knew as an egg, twelve years ago. She has had only one mate. As against this, another bird known for eight years has had a different matrimonial status each year.



Above, a young yellow-eyed penguin eighteen days old and, at left, a male yellow-eyed penguin giving the full trumpet call as he returns to the nest. The author says that it took him four years to get this photograph and no other exists.

In making my records I have had to give the birds the anonymity of numbers rather than try to name them. Records show that, during the first six years of my observations, the male 39 was mated to the female 2, and, not far away, the male 34 was paired with the female 27. I did not know when these two pairs were first formed. In the sixth year, the young male 51 lost his mate and failed to secure another. In the seventh year, I found 39 mated to 27, 51 to 2, and 34 was left unmated. Without going into detail, my construction of these events is that 51 took 2 from 39, and then 39 promptly separated 27 from 34. Male 39 retained 27 for three years, after which the latter was found dead. In the tenth year, 39 was again mated to 2, and was still mated to her in my fourteenth year of study.



A pair of young penguins seventy days old and ready to venture into the ocean.

Male 34, after missing a year, was mated in the next four years with the females 56, 2, 4, and 57 respectively, so that in eleven years he had five different wives.

Another complication in pair-formation behavior is the excess of breeding males over females — a difference of fifty percent. The result of this preponderance is a large number of unmated males in any given season. Moreover, my figures show that only two males have managed to survive the fourteen years under review without missing a year's breeding. On the other hand, there was one male that for seven years, to my knowledge, failed to secure a mate. His lack of success was not because he did not try, for each year he built a good nest — in fact a better one than the other males. In the eighth year, he managed to secure a mate, but there was no competition; he was the last male available in his particular colony. Again, there is an instance, in another colony, of a male, known as a chick and now eight years old, that also has never been mated. What is the cause of these discrepancies? It would seem that some males have a better way with the "ladies" than others. It is certainly not a matter of chance.

A final example may demonstrate that a female is not compelled to accept the male who presses his suit on her. On one occasion, just before the eggs were laid, I found a certain female penguin, by number 73, associating with male penguin 72, whose wife 65 was at sea. I happened to arrive at the nest just as 65 was coming home. It was almost dark as I slipped behind a tree trunk to watch, and not long after I heard flippers beating mercilessly on another penguin's back. Female 73 took her thrashing without retaliation and was ejected from the nest by the irate 65. Such is the law in the penguin world. That season 72 and 65 reared two chicks without further complications, and 73 went back to her old mate 74 and did likewise. There the matter stood for two years, at the end of which time both pairs again reared two further chicks. A few days after their chicks entered the sea, 72 and 65 should have been molting together at their nest site, and 74 and 73 at theirs. But 65 disappeared in those few intervening days, probably meeting her death in some way. This was an opportune moment for 73; she saw her chance, and molted with 72. Poor old 74 had to molt alone. The following season 72 and 73 mated and reared a family. Moreover, they remained together until 73 lost her life in a rabbit trap.

The discovery of the affinity of 73 for 72 was one of the most important pieces of research I have ever made on penguins. It has contributed much to the theory of bird behavior, and demonstrates how difficult it is to obtain important data. It was only because I had known the birds personally for some years that I was able to realize the value of what was about to happen on that eventful evening when night was falling. Well-meaning friends have at times suggested that, after all these years, I should have found out all there is to know about penguins, and that I should turn my attention to the study of another species of bird. I consider this would be unwise while there are yet many, many problems to solve. For example, we cannot yet answer these two questions, (1) How are the penguins married? (2) What are the factors that cause "divorce?"

Snow Crystals

By LOUISE MAYERS MEREDITH

The truth that causes tears to start
Perfects each crystalline white part
Of flakes that fall as snow all day —
Flakes made from tears that blew away.

Wintry Forest

By OSCAR HYNEN

Translated from the original Finnish by H. Brabon

★

"BLACK is the spoor of the summer hare," says an old proverb, and so it is. Man cannot say, when the ground is green, along which path in the woods the black-cock tripped, through which fence-crack the cottontail slipped. But when snow covers the earth, when the drifts of January have smoothed down the hillocks on the forest floor, and dressed the tree stumps in white hoods, then you can effortlessly solve Tapio's mysteries.

When you wander in the forest after a thawing snowfall, then, like in an open book, you read the secrets of the wilderness, using the fresh tracks on the surface of the snow as word-forming syllables. They tell you of the forest, its language, its habits, its sorceries.

From the highway branches the forest-road, which loggers and firewood haulers use from time to time. Whenever you pass it, it seems to beckon invitingly to you, to ski or walk along it, promising the Nature-lover new views, wondersome new secrets. One day you answer its call. At first the road winds uphill over a snowy heath, where tall, hoary pines point their redbrown trunks and dense crowns skyward. All the way up here, the weasel, who lives in the stone fence by the highway, has traveled on his nightly hunts, for you notice his well-known tracks along the surface of the drifts. On the top of the slope, tracks of the nimble black-cocks tell where they gorged on juniper berries.

Then your skis begin to slide downhill, the pines become smaller, and you speed into a fir-thicket at a fast clip. Farther downhill the firs grow smaller, their branches more moss-covered, and you ski into a dwarf-birch forest, and the marshes open ahead of you. A while back you heard the echo of the woodchopper's axe, but now the dead silence of the wintry wilderness rings in your ears. The white-shrouded marsh spreads level, as far as your eye can see.

On your right the low pine-woods are radiant with the pale light of the setting winter sun. On the left rises the black-green fir forest; an unknown, cold wilderness. Ahead, on the white expanse, here and there a few stunted birches and pines have tried to take root, but mostly the marsh is bare of trees, reaching into the blue distances of the far horizon. Trees are unable to grow big or thrive in the wet, soft and boggy earth of the tussocks. When marsh-trees get man-high, the winds come mauling. The hair-fine root-threads, the nourishment channels, loosen, and the young tree is doomed to starvation and a slow death.

The fragrant summer-gorse is buried; the blackened foliage of the cranberry vines rattles drily as the skis slip through them. The dwarfed birches stretch their bare, puny branches, the willow thickets stand whiplike against the whiteness. It is like being at the tree-line on a tundra, where all vegetation ends.

The white ptarmigan, whirring up in flight, adds to your feeling of the tundra. You have seen his winding tracks under the willows. The snow-bird arrived here by flight, softly whisking the surface with his wing-tips, and then denting a hollow with feathery breast in landing. There its small foot slipped a little on the underlying ice.

The red fox, too, has been on an inspection tour of his hunting grounds. Slowly and placidly he has trotted along, the footprints following each other like dots in a straight line. But the cautious "red" did not dare jump across yesterday's ski-tracks, only place his paw-marks parallel with them.

In the top of a scraggly pine at the edge of the marsh, sits a needle-gobbling wood-grouse, his black-green breast irridescent in the slanting rays of the sun. Farther away you see another, and yet a third bird. But you leave them to eat in peace. You have only come to greet them; to visit as a friend. You do not want to shatter the sleeping silence with the harsh crack of a gunshot.

"In every child's life," writes Mrs. H. Brabon from Malibu, California, "there is some one adult who is the youngster's worshipped idol. Mine was my mother's younger brother, who spent his summers and Christmas holidays at my childhood home in Finland. He earned his university education by teaching public school in a nearby backwoods village, and then became a teacher of zoology, geography and gymnastics.

"The reason I idolized him was that he was the only adult among all my innumerable relatives who took interest in the 'ugly brat,' and patiently answered all my endless questions, showed me the wonders of Nature, taught me not to be afraid of anything living, took me sailing in summer and skiing in winter, and taught me fencing. My uncle contracted tuberculosis from overwork and passed away in 1906. But his memory lives vividly in my heart. He used to tell me, when I grew up, to translate some of his stories. This is one."

(We felt that Uncle Oscar drew such a lovely picture of the wintry forest of Finland that we were duty bound to cooperate with his niece in paying him tribute by publication of this sensitive appreciation of Nature by one who loved her deeply.—Editor.)

You push away from the marshlands, turning into the fir woods, where the gray hazelhen, on your approach, whirrs from tree to farther tree. Here the cottontails seem to have held a party. Crisscrossed tracks are veritable pathways. Up on the logpile they have cavorted, peeled white the top branches of felled aspens. Amused, you ski onward, and stop at the base of a dense old fir, where the leaves and branches of lingonberry plants gleam radiantly green. In the snow under the sweeping bottom branches, the tiny field mice seem to have led a joyous life, for the snow is like a closely written page, their delicate tracks now disappearing under the surface, now reappearing again.

Far away a gust of wind sings over the marshes, but here among the trees it is not felt, the moss on the branches of the old fir not even stirring. After a while silence reigns again. A woodpecker hammers away somewhere; grosbeaks have dropped birch-bud peels on the snow; the small, precise tracks of a squirrel are traced from one tree to another

Again you push your staves into the snow, and your skis slip past a fallen fir's earth-clotted roots, resembling a snowy, rising bear. The ptarmigans have used it for their sleeping-place, their tunnels through the drifts reminding you of the Eskimos' igloo entrances. Small birds in the fir-tops chirp softly, and a falling fir-cone just misses your head. The chickadees bustle about, looking for a hiding place for the night, and chatter among themselves, "chi-chi-taa-taa-taa." The grosbeak calls to his gaudy colored brethren. All are getting ready for the night, for the sun has disappeared. The frosty sky blushes redly, the jagged outline of the forest is a steely blue. You turn back from your winter road to the highway, where the hoarfrosted powerlines streak whitely from pole to pole. The highway-sign reminds you of being back in the realm of man.

*

The Harping Pines

By LAURANCE M. THOMPSON

IT HAD snowed the night before — a heavy, wet, clinging snow that swept in unexpectedly after several fine days. Then with the morning came a lovely day, clear and windless, with the great pines lifting their burden of white against the background of a blue, blue sky.

In the clear whiteness under foot we could read the stories of the early morning after the fall had stopped, although not too clearly, because the snow had not settled yet. The tracks were blurred by the loose snow that fell back into the print as each little foot was lifted.

As the sun became warmer we passed through the birches, where the chattering chickadees were sending down showers of sparkling drops and puffs of snow as they worked upside down to find the clusters of birch seed. On up the hill, we entered the quiet of the white pine woods. It was like stepping from a sunny street into the solemnity and mystery of a cathedral.

Then suddenly we heard it! Faintly — louder — rising and falling; all about us was a faery music like the plucking of a hundred tiny strings. "Pong! Panka-ping!" Then above us, louder and stronger, "pung!" followed by lighter, higher pitched notes tinkling off into silence like a run up the strings of a harp. We looked up, but saw only the pines, with bits of snow falling. We looked at each other, amazed. What could it be, that lovely dainty music?

Then we saw it happen. A large blob of wet snow, the size of a fist, fell from the upper branches and struck squarely on a dry, dead branch below. "Pong" went the branch, and, as the broken, smaller pieces of snow sifted downward through the dry twigs, these in turn responded with the higher notes, ever lighter fainter, drifting away, only to be followed by a new chord as more snow softened and dropped from the upper, green branches.

We had never heard this crystal symphony before; have never heard it again. It must take just the right combination of weather and temperature, and dryness of the under branches of the trees. This woodland music is entirely different from the sibilant but ominous sound of sleet pellets driven through the pines by a storm wind. Then you have "all the trumpets of the sky," a full orchestra of wind and wood-wind sounds, and perhaps even the roar and crash of a falling tree as the storm vents its fury on the forest.

But here was the silence of a windless day; then the harping of the pines in a harmony not of this world. One almost expected to see wood nymphs and fauns come stepping down the aisles of the forest in a long forgotten dance. Almost? What was that, up there near the trunk of the great old pine from which most of this music has sprung? Something moved, turned, and was gone in graceful bounds, her white flag bobbing out of sight among the pines. Yes, the deer have come back to our woodlot — and, alas, to our garden. Was she, too, listening to the harps of elfland all about her? Had she, too, been held in the trance of that mystic plucking of the strings by unseen hands?

We stood and watched and listened, and were silent. You cannot talk in the presence of such beauty of sight and sound, such purity of air. One needs no ritual — no man-made creeds, at such a time, to come close to God. In very truth: "The groves were God's first temples."

It Is Fun Being A Rock Hound

By HOWARD E. JACKSON

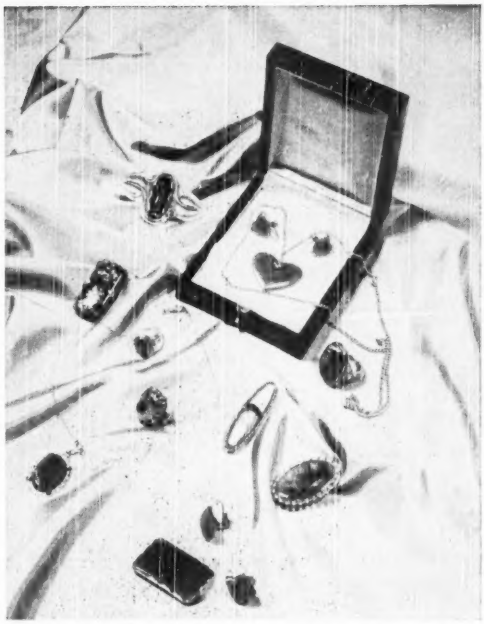
"IF YOU want to meet a rock hound, drop in on A. I. English in Seattle," I was told. I did want to meet a "rock hound" so I "dropped in," finding that wiry old gentleman and his white-haired wife comfortably seated in front of their television set, seeing their favorite show. When I said I wanted to talk about collecting gem stone materials and fashioning gem stones out of them, the TV set and the all-absorbing show were forgotten.

Rock hounds are like that! And Mr. English is one of them, for he has been collecting and cutting rocks as a hobby for years, on a strictly amateur basis. He showed me boxfuls of small uncut and cut stones, and proudly pointed out his prize possessions. In his workshop, he showed me more of his uncut specimens, rummaging around until he finally found a stone of especial interest to him. It was not worth much in dollars but that uncut rock reminded English of the pleasant trip with his wife, during which he had located it. Mr. English described how he would divide the slab, and cut and polish the pieces into gem stones. He had no thought of selling any of the finished work, but said he might give a set of earrings to his wife, a bracelet to his little grand-daughter and a tie clasp to a special friend.

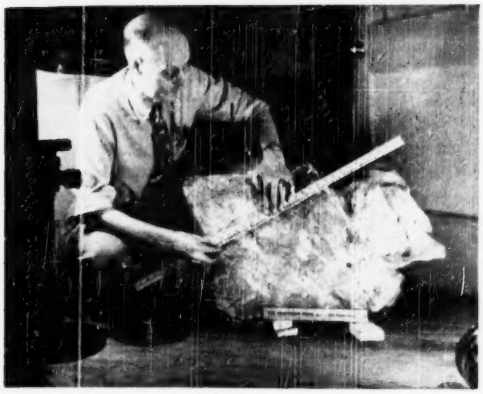
It is that way with rock hounds. The cost of gathering the stones, and the time consumed in cutting and polishing them are a part of the hobby. Mr. English works hard all year so that he and his wife will have enough money each summer to take an extensive field trip. A few years ago they hitched a house trailer to their car, so that they could park wherever they wanted on their prospecting journey.

"That's the way to really go rock huntin'," says Mr. English. "We're too old for that now, but we still take to the road for a two or three months' circuit trip throughout the northwest states each summer."

While Mr. English may not be typical of the thousands of amateur "pebble lickers" in this country, his interest and enthusiasm for his hobby is symbolic of this ever-



All of these jewelry items are the result of the hobby activity of amateur lapidary work. Well-cut and polished stones in well-chosen mountings have a market value that finances the rock hound in the pursuit of his hobby.



This 436-pound, apple-green boulder of jade found near Lander, Wyoming, was valued at $5000. Karl Hillquist, gem authority, is marking it off for cutting on a saw.

H. E. Boucher, who discovered the jade at the left, shows some of the larger slabs after sawing. These were reduced again to a size for use in cutting cabochon gems from them.

The boom in amateur lapidary activity as a hobby is mainly due to the new machines used in working rough stones into finished gems. Here an amateur gets some advice from "Professor" Hillquist, teacher at the Seattle Y.M.C.A. lapidary shop. One compact machine will perform all needed functions.

increasing tribe!

There are more than five hundred amateur gem stone collectors and cutters in the Seattle, Washington, area alone, for example. Karl J. Hillquist, teacher of lapidary arts to more than 2500 laymen in the State of Washington, predicts that a million people will join the ranks of rock hounds now that the ancient and often secret arts of gem-cutting and jewelry-making have been told.

That figure does not seem far-fetched, for young and old, rich and poor, skilled and unskilled are joining the ranks daily. Interest in the craft of collecting and cutting gem stones exceeds the ability of most clubs, organizations and school systems to supply equipment and teachers. Classes have sprung up all over the country — in adult education outlets, in army and navy hospitals and training camps, in prisons, vocational rehabilitation centers and in Y.M.C.A.'s.

The majority of people who take up gem making — the hobby of kings — do so for pleasure. Most of them retain their amateur status. Hundreds of them build up collections of gem materials and cut gems, many of considerable value, but they would not sell their "stones."

On the other hand, many people go into this fascinating hobby for profit as well as pleasure. Indeed, gem stones have become a $12,000,000 a year business on the West Coast.

Amateur lapidary activity as a hobby can, in fact, pay its own way, at the same time providing hobbyists with an outlet for their desire to create objects of lasting beauty. There is always a good market for well-cut gems of various kinds, polished specimens and the like. Supply houses buy them, thus aiding the rock hound to keep his shop supplied with wheels and other essentials.

This hobby is, also, one of the few, creative activities that offer both field and home enjoyment. Most gem hunters spend weekends and vacations collecting the rough stones, building a supply for cutting during the wet, cold months. Also, two or more people — often husband and wife — can work together as a team. They collect together, while he cuts the gems, and she does the jewelry work to make them wearable.

The end result of getting into this hobby is unpredictable. "Professor" Hillquist became president of a large lapidary equipment company, as well as teacher of beginning and advanced lapidary in the Seattle Y.M.C.A., the best-equipped school of its kind in the Northwest. J. Robert Oppenheimer, who was an active Mineralogical Club member at eleven, has become a top thinker on atomic energy.

One of the biggest thrills is tracking down precious and semi-precious stones in far-off places, and then fashioning them into gems. But it is no longer necessary to travel afar for agates, garnets, topaz, tourmalines and sapphires. They are all found within the continental limits of the United States, and searching for them here is just as thrilling as in any foreign country. The Pacific Coast ocean beaches are fertile fields for gem stones, especially in the quartz family. Moving eastward, the desert and the mountainous volcanic country hold almost unlimited possibilities.

Amateur gem hunters have found valuable locations in almost every State. H. E. Boucher found a large jade float boulder just north of Lander, Wyoming, in 1945, after only five days of searching. It weighed 436 pounds, and was appraised for $5000. Three "finds" of chlorastrolite were made in succession, near Keweenaw and Ahmeek, Michigan, within the past few years. The last find was so accessible that experienced rock hounds had passed by the spot. Amateurs have found amethysts in Arizona, aquamarines in Connecticut, sapphires in Montana and rubies in North Caroline.

Many amateurs belong to gem, mineral or lapidary clubs. There are more than 150 such organizations, and they are increasing. The members have regular meetings, go on field trips together, swap specimens and information. They know the tricks of the trade, as well as any professional, right down to testing a gem for its ability to take a polish by scratching it on a bottle. If the stone will scratch glass it will take a polish, and many amateurs carry a small, four-sided bottle with them for testing purposes.

Many rock hounds consider field trips the most fun in amateur lapidary activity. There is always the lure of the unknown: the possibility of the unexpected.

Field trips may also become complicated, for stone collecting is a many-sided affair, and rocks, minerals and uranium all may be in a single area. Some rock hounds start looking for one of the 300 different fluorescent minerals, carrying along a mineralight. Other collectors keep a watchful eye out for uranium, while prospecting for stones, taking along a Geiger counter. The study of petrified wood, or of an Indian munitions manufacturing grounds may become a by-product of the trip.

In consequence of this, many hobbyists are able to produce distinctive displays as a result of field trips. Josephine Roberts of Duckwater, Nevada, makes ornaments fashioned from many varieties and subvarieties of colorful quartz. She uses chips of different sizes and various colors found in one ancient Indian munitions grounds. A flower is made up of chips of red, yellow and brown agate, flint and jasper. The leaves and stems are made of fragments of green jasper, green plasma and brown-colored, common opal. A total of nearly one hundred chips comprises the piece, and it is put together so that no illumination is required to view the small, sawed transparencies.

Some collectors and amateur lapidarists stick to the making of cabochon gems such as are shown here. Others go in for faceted gems, a process made more simple by new machines. Patience is still required, however.

William Till, a retired organist, did something different, too, with the fifty slabs of hornblende-gneiss stones that he gathered. The stones range from four to six feet in length, and he arranged them into a huge xylophone. Padded mallets are used to play the instrument. The Till family organized a concert company and toured America and Europe, featuring the "Rockophone."

The boom in amateur lapidary activity as a hobby is due mainly to the new machines used in working rough stones into finished gems. Time was when gem making was a closely guarded secret, and know-how was passed on from father to son. With the new machines, amateurs can now finish off a cabochon (without faces) gem stone within half an hour, and a faceted (with faces) gem in from three to six hours. The majority of gem stone cutters feel that it is far wiser to buy a compact lapidary unit (which can be had for about $100) than to try to build the equipment. One compact unit will perform all the principal lapidary functions — sawing, grinding, sanding, polishing, lapping, faceting and sphere cutting.

The majority of beginners stick to cutting and polishing cabochon gem stones. The cutter selects the most interesting pattern and color the sawed slab will yield, and marks a clear outline of the area to be cut. He then saws away the surrounding material, leaving a safe margin around the outline of the cabochon. The specimen is then further reduced to conform with the desired outline by crushing off small amounts from the edges with a "nibbling" pliers. The rough stone is then ready for the grinding operation.

Grinding is divided into two steps, rough-grinding and fine-grinding. In the grinding process, the stone is held in the tips of the fingers and rotated against the edge of a revolving wheel. The cabochon gem is

brought as closely as possible to the form desired during the rough-grinding operation.

Frequent inspection is made with the use of a loupe or magnifier to detect flaws and scratches. After replacing the coarse grinding wheel with the fine one, the grinding operation continues until any minor imperfections of form, or marks from the coarse grinding abrasive, are removed. The gem takes its final form during the fine-grinding operation. The purpose of the subsequent steps of sanding and buffing are merely to bring the stone to progressively finer degrees of finish until a high polish is obtained.

This procedure is generally used for all members of the quartz family, but slightly different techniques are used for jade, turquoise, fire opal, lapis lazuli, rhodonite, amazonite and other gem stones. Generally several stones are carried through each successive operation together to save time.

More amateur lapidarists are turning to faceting as another intriguing phase of the lapidary art. Until recently this work has been looked upon as secret and difficult, rarely to be attempted by amateurs. With the new facetors now available, faceting can be done successfully by any one with an average amount of patience. With the use of a facetor, ring stones or faceted beads, earrings and other gem stones are easily within the scope of the amateur lapidarist.

Hobbyists with imagination have fun making beautiful crosses, hearts, stars and other intricate shapes on a trim saw.

There seems to be no end to the possibilities of amateur lapidary activity for Nature has been bountiful with supplies. Recently man has added his small bit to Nature. The war development of synthetic sapphire, ruby and spinel has given additional scope to the lapidary hobby. Rich in color, identical with the natural stones in hardness and other physical properties, these new synthetics offer an inviting field for the hobbyist in the creating of beautiful and highly valued gems.

Vignette

By GERHARD FRIEDRICH

I never knew a storm so fierce and white,
Such drifts of snow, and such an eerie night,
And then a morning bathed in perfect blue,
The woods so silent, and the earth so new,
And halfway down the slope, grotesquely near,
Wide-eyed and starved-to-death, a frozen deer.

The Colorful Cowry

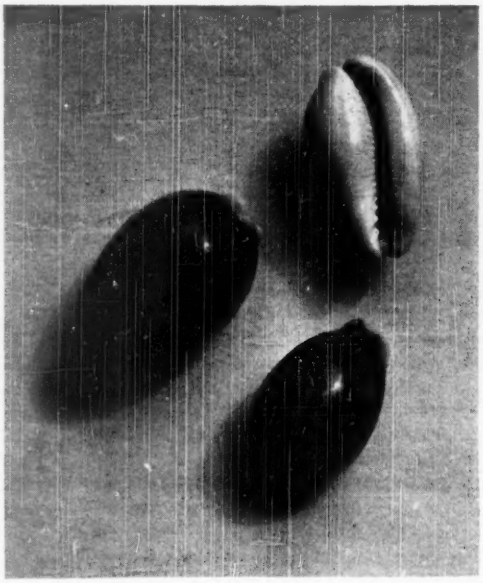
By RUTH DUDLEY

THE COWRY is one of the most beautiful of all the sea animals. Its smooth, well-rounded shell curves around to an opening that runs the full length of the shell and is edged in tooth-like ridges. It not only is beautifully colored, but has a layer over the whole surface that gives it a bright, polished appearance as though someone had spent hours rubbing it up. One kind of cowry, found at Key West, is so highly polished it could actually be used as a mirror.

The cowry seems, curiously enough, to be able to paint its own shell home in gay and delightful designs, and this ability of his seems to grow with the years rather than diminish.

The little animal that lives in this pretty shell home is lovely, too; gayly colored and graceful. There are at least one hundred and fifty different kinds of cowries in the world, but only three of these are found on the Atlantic coast and only one on the California coast.

Natives in the Fiji Islands put great value on these cowries, and they are worn by the chiefs as marks of royalty. Cowries are used in India to trim the harnesses of elephants and horses. Borneo tribes use the cowry shells for personal decorations. Elsewhere, including the South Seas, they have been used a great deal as money.



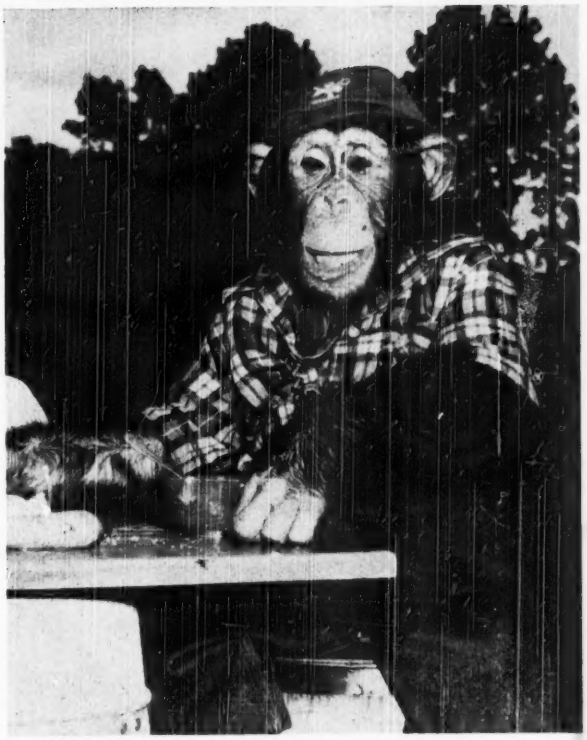
The cowry pictured here is from the California coast. It is white along the side of its opening and has a beautifully polished brown back.

"Duke," Tulsa's Favorite Chimp

FROM time to time we have presented a picture story in a "Growing-up-with-Nature" series involving Blaine and Glenal Davis of Tulsa, Oklahoma. Blaine is "going on" nine, and Glenal bears the same relationship to the advanced age of six. The youngsters' dad is Hugh Sterling Davis, Director of the Tulsa Zoological Garden, and it is a rare day when the Davis home does not have as a house guest at least one animal that, at the moment, needs more personal attention than the busy zoo attendants can give it.

The result has been that the Davis youngsters have had a wide variety of animal pals, from snakes to "Duke," the white-faced chimpanzee, who is "going on" four.

"Duke" came to the West Coast, with a shipment of other baby chimps, at the tender age of three months, and at a time when such animals need much affection and special care. The chimpanzee was purchased by Don Napier, better known in the West as "Chief" Napier, a Cherokee Indian from Tahlequah, Oklahoma. Don wanted "Duke" as a ballyho to attract people to the platform of his medicine show. The chimpanzee traveled with the Indian for two years. The "Chief" taught him many tricks, and slept with his traveling companion in a truck.



"Duke" all dressed up and enjoying his breakfast of a bowl full of cereal. The chimpanzee eats deftly with a spoon. His table manners are passable. Below, bedtime and a bottle. The Davis youngsters encourage "Duke" to go to sleep by crawling in with him. He sleeps on his stomach, back or side like a human, and snores, too.

One way to get the Davis youngsters to help with the house work is to enlist the co-operation of the chimpanzee. He loves to sweep, and, with a dust cap and apron as a uniform, he can really make the dust fly. The result may not be according to the best house-keeping methods but it is fun.

"Duke proved to be such an apt student and so smart that he began to "steal the show" from Napier. The crowds were more interested in the chimpanzee than in buying medicine. Also his owner feared that "Duke" might contract pneumonia while living the rather rugged life of a traveling medicine show.

Casting around for someone who could assure the chimp a better home life, Napier got in touch with Mr. Davis. The result was that, through school assembly programs put on by Hugh Davis and his wife, Zelta, aided by Blaine and Glenal, pennies and nickels contributed by the school children of Tulsa added up to enough to purchase "Duke."

The chimpanzee now lives in a large play cage in the Tulsa Zoological Garden. But he spends a great deal of time with the Davis family so that his training may be continued. He now has a repertoire of tricks that is out-

"Duke" enjoys taking a bath, scrubs himself quite well and is particular about washing his hands. He is shown taking a bath in the same tub that has been the bath spot for many of the animals that have been house guests in the Davis home, including "Carmie," the baboon, and "Bongo," the bear, earlier pictured in one of the "Growing-up-with-Nature" series featuring the Davis family. At the left, Glenal does a little primping at her dresser; so does "Duke." From the expression on the chimp's face it looks as though there might be a tangle in his hair that is pulling a bit.

standingly varied.

"Duke" can ride a tricycle, having learned on a bicycle, and can roller skate. He tumbles and does back flips, claps hands and feet, and smiles and laughs on appropriate occasions. On the musical side the chimp beats a drum, plays a piano and dances to music. He smokes a pipe that contains no tobacco, wears glasses and "reads" a paper, and scribbles on a blackboard. He enjoys sweeping with a broom, plays with a toy wheelbarrow and pulls a toy wagon, and enjoys both pushing a baby buggy and riding in it. He enjoys swinging and riding a pony, combs and brushes his hair and eats with a spoon. He likes taking a bath, scrubbing himself, and is not above doing a little scrubbing of clothes. He hates both snakes and turtles.

"Duke" specially loves to play with children. They all treat him with the greatest kindness and the chimpanzee reciprocates with kind treatment of his playmates. As "Duke" grows older, Mr. Davis says, he will have to be watched for signs of ill temper that might be dangerous to his young playmates. Experience indicates that when a chimpanzee is eight years old he is likely to become crotchety and have to be confined to his cage. Training a chimpanzee, Mr. Davis adds, requires great patience, but these animals can be taught to do a wide variety of simple things in a quite human manner if shown, over and over again, what to do.

A cowboy chimpanzee riding side-saddle on a Shetland pony mount. "Duke" loves to ride but has not yet entered any of the western rodeos.

Taking the babies out for a stroll. In this case the babies are two-weeks-old African lion cubs. In fact, "Duke" prefers such live cargo to a doll. Looking on are, left to right, Glenal Davis, Nakita and Jerry Slack, and Blaine Davis.

The Davis youngsters' two month-old Indian leopards, cute little balls of spots that were born in the Tulsa zoo. They are young of the same kind of leopard whose escape from the Oklahoma City zoo caused such an unnecessary scare not long ago.

Some events of a day with the Davis youngsters and their neighborhood friends, with never a dull moment for either "Duke" or his young pals, who contributed to bring the chimpanzee from life with a medicine show to the comfort and care of the Tulsa zoo and the Davis home. At the left the chimpanzee puts on a baby act in Glenal's baby buggy, which he fills out quite generously. He also likes to push the buggy. After all, the chimp is only three and one-half years old and perhaps entitled to a little babying.

When the ice cream truck comes along "Duke" is right on the spot for his treat. Here he seems to be gloating over the fact that he has gotten a double stick of ice cream.

The chimpanzee puts on his glasses and demonstrates some complicated geometry theorems, or perhaps does a few algebraic equations. Note that he is left-handed as he demonstrates.

Swinging is a big event in "Duke's" life and he has plenty of helpers to give him a good start. In this picture the chimp seems to be arguing with Glenal as to whose turn it is to swing.

Spanish Moss- Beautiful and Useful

By HUGO H. SCHRODER

Photographs by the Author

SWINGING in graceful festoons from southern trees, Spanish Moss adds its charm to the outdoors in the southland. This plant also has various important uses.

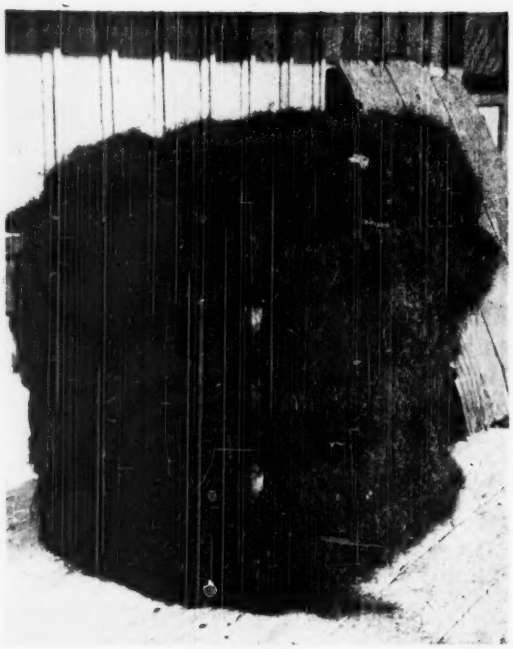
Spanish Moss is, actually, a true air plant, or epiphyte. It is known to botany as *Tillandsia* and the species known as Spanish, Florida or long moss, is *T. usneoides*. The specific name comes from the fact that this growth resembles the lichen *Usnea*.

At first glance one would think that the moss was drawing its nourishment from the host tree. In fact, *Tillandsia* uses the tree only as an anchoring place and draws its nourishment from the air. Indeed, the moss will sometimes be found growing from worn spots on insulated wires, and there is scant food, certainly, to be drawn from such a source. Any place where the feathery, barbed seeds can find a place to lodge will serve this plant. The only way in which Spanish moss can harm a host tree is for it to become so dense that it smothers the leaves.

In various parts of the South the "moss" is gathered commercially, as shown on these pages.

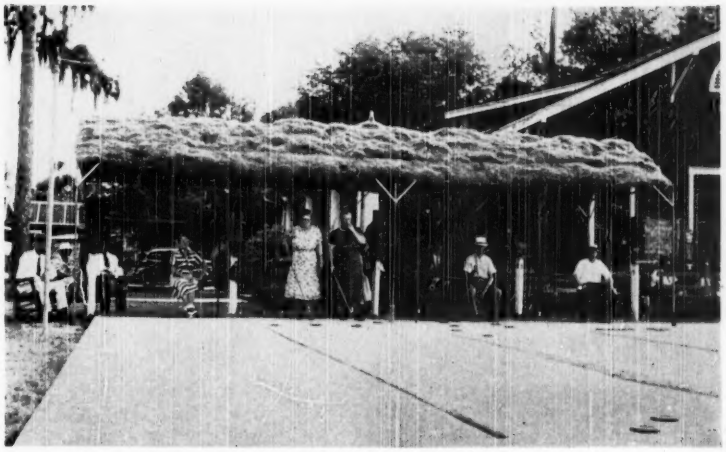
Spanish moss in graceful festoons on a dead tree in a Florida moss yard. The tree died from natural causes and not from being a host to the moss.

Below, left, a load of green moss arrives at the moss yard and is waiting to be weighed. The stuffed rear seat of the car, a platform back of it and the trailer bring in a considerable load. Below, the moss is piled in the yard and is wet down. This is to start the process of separating the inner fiber from the rest of the plant. Exposure to sun and rain, after a thorough wetting, speeds the decay of the outer covering of the plant. Several months in the yard are required for the moss to "cure."



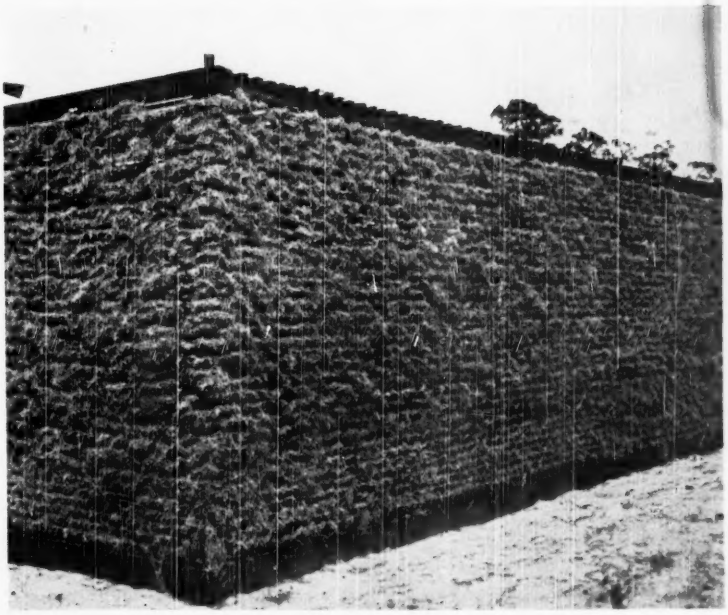
Above, three types of Spanish moss at the moss yard. At the left is the green moss as it is brought in. In the center is the "cured" moss after exposure and drying. At the right is the inner fiber after ginning. This is the commercially valuable product used in upholstering, for mattresses and other purposes. Above, right, is a bale of the moss fiber ready for shipment to a furniture factory.

After Spanish moss has been exposed to the elements for several months in the moss yard, and the outer covering of the plant has been loosened, it is strung over wires in racks for drying before it is taken to the moss gin where the fiber is extracted from the moss.



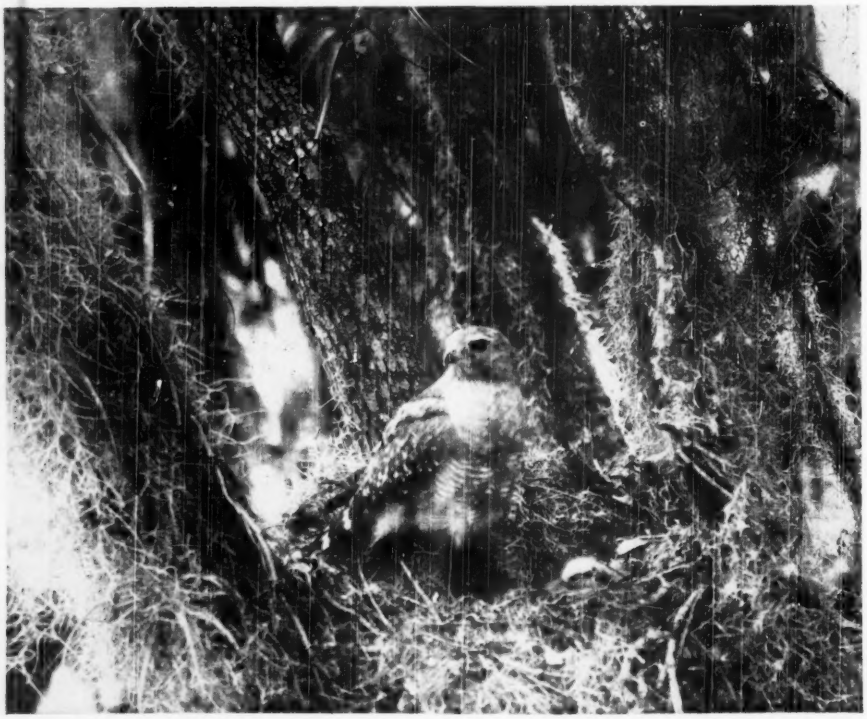
Spanish moss here serves as a roof and for shade at a shuffleboard court in Florida. This is, temporary however, since it does not lend itself to permanent use for thatching after the fashion of dwellings in other parts of the world.

An acrobatic workman in the moss yard finds the acres of spread-out moss a springy cushion from which to try somersaults.



Spanish moss in the green stage is put to many uses. Here a plant shed has been covered with chicken wire, through which the moss has been tightly woven. This use provides a temporary wall and shelter from sun and rain.

In Nature Spanish moss serves dwellers in the tress. A mother flying squirrel poses for her portratit at the entrance to a nest that she has built from this airplant. Below, a red-shouldered hawk stands on a moss nest in a tree in a Florida hammock. The nest is lined with the moss, which also serves as a protection for the nest. Many birds use the epiphyte as a nesting material.



Save Bergen Swamp

For at least a century naturalists have found in Bergen Swamp some of the rarest plants known to New York State. Some of these plants have their only known habitat in the State in this wild and varied arboretum. Indeed, the area is a living museum of incomparable value.

Bergen Swamp is located some twenty miles from Rochester in Genesee County. It is within easy access of the principal centers of higher education, population and industry in the western part of the State. This strategic location, of course, makes the area vulnerable to the march of what we call civilization, and "development" stands as a constant threat to the future integrity of this unique acreage.

Recognizing this danger, and conscious of the great loss that would be suffered if the swamp were to be destroyed, a group of conservationists formed The Bergen Swamp Preservation Society, Inc. The organization was chartered by the Board of Regents of the State of New York in 1936 with an objective "to preserve inviolate for all time in their natural state the lands known as Bergen Swamp; to conserve the flora and fauna of the lands owned by or under the control of the Society; to offer to schools and colleges and other properly accredited students or groups of persons access to the swamps and forests of the Society for the purpose of observation and study; to publish from time to time scientific and cultural information covering the biology and wildlife of the areas controlled by the Society."

Since the creation of the organization, about 350 acres of the swamp land have been purchased. In 1948 the Society was given the $1200 award of the Founder's Fund of the Garden Club of America, this being applied to the acquisition program.

The total acreage that should be acquired, properly to protect the area, runs to about two thousand acres. The swamp is about three miles long from east to west, and varies from one to one and one-half miles in width, north and south. Along the northern boundary Black Creek maintains the swamp conditions, while numerous hard water springs supply the swamp habitat along the southern boundary. Having remained in virtually primitive condition, a unique vegetational pattern has been created. Some ten different ecological plant associations, or communities, have developed, with nearly a thousand species of flowering plants, conifers, ferns, and the other groups maintaining residence there.

Bird life is varied. A number of warblers not usually found nesting in the counties bordering Ontario Lake, nest within the boundaries of Bergen Swamp. A variety of other birds is found. Zoologists revel in the area, and three reptiles, rare for that part of the country, live and breed in the swamp.

Dr. Walter C. Muenscher of Cornell University is president of the Bergen Swamp Preservation Society, and he probably knows more about the area than any other person. For more than three decades he has explored the swamp, visiting it at all times of the year, in all kinds of weather, and in all of its moods. Dr. Muenscher has also published a number of scientific and popular articles on the unique contents of the swamp, these serving as indisputable evidence of its importance and the wisdom of the drive for its preservation.

"The part of Bergen Swamp that is best known to naturalists," writes Dr. Muenscher, "consists of an open marl bog surrounded by a belt of forest and swampy thickets. While the marl bog is an extensive and interesting feature of the swamp it represents not a static but a dynamic area, the uniqueness and persistence of which are highly dependent upon the surrounding physiographic features and the types of plants that these support.

"A distinctive element in the vegetation encircling the open marl bog is the dense white-cedar or arborvitae thicket. The durable wood of the trunks of these trees is so highly prized for posts that, unless their exploitation can be halted, the most characteristic regions of the swamp are in serious danger of destruction."

The preservation group has made a splendid start toward saving the entire area, but the threat grows stronger month by month. It would be a tragedy if the maximum of twenty thousand dollars, estimated as the funds needed to throw protection completely around Bergen Swamp, are not forthcoming. The officers and trustees of the Society are contributing to the fullest extent possible, and all serve without remuneration of any kind, the only overhead expenses being those essential in spreading the word of the importance of saving Bergen Swamp. H. E. Clements, 1116 Sibley Tower Bldg., Rochester 4, New York, is treasurer of the Society, and further information is available to all interested.

Month after month and year after year we see small but unique areas like Bergen Swamp disappear before the march of development. Once they have been sacrificed to exploitation that yields a small and temporary return to the exploiter they have gone forever. What Nature took centuries to create can be destroyed in a few days by man with his axe, saw, bulldozer and other tools of development. This should not happen to Bergen Swamp, truly entitled to be called "unique."

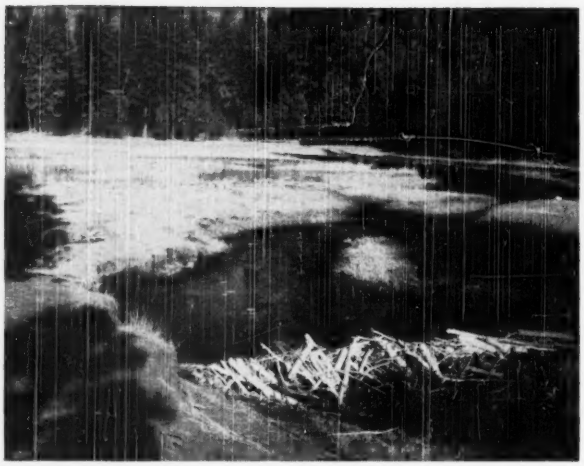
Rodents Practice Sustained Yield

By VICTOR B. SCHEFFER

U. S. Fish and Wildlife Service

ONE summer, when I was driving along a dusty road across an open plateau in the Blue Mountains of eastern Oregon, I suddenly sighted a beaver dam. It lay across a trickle of water no wider than the span of my hand. Puzzled, I looked around for the trees that are commonly supposed to identify good beaver country. "No," said my companion, a sheepherder, "there isn't any timber nearer than two miles. The beavers have been here for a couple of years and they seem to be doin' all right, but I don't know what they're eatin'." After studying the situation and after seeing, later, beavers in other parts of eastern Oregon living under semi-arid conditions I came to the conclusion that the animals will, if necessary, exist comfortably on a diet of aquatic grasses and willows.

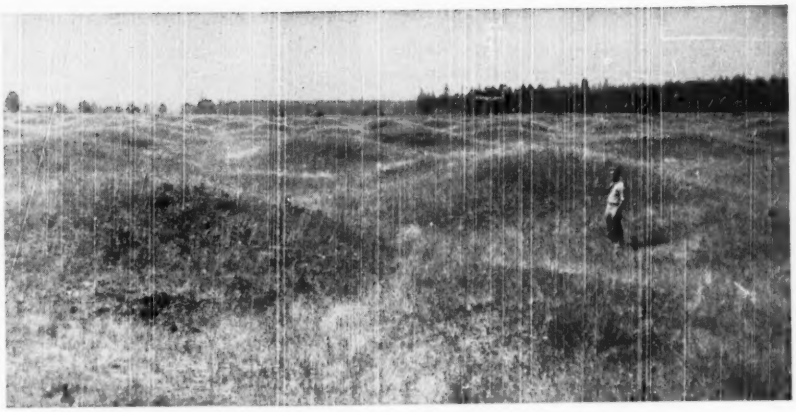
When beavers invade a new territory upon which a small grove of timber is growing, they usually, with great enthusiasm, attack the standing supply of aspens and poplars, their favorite foods. Like many humans they tend to destroy more than they can use, and they fell trees that eventually turn hard and brittle before the tender bark can be removed for food. When the more palatable species are gone, beavers turn to alder, maple, and lodgepole



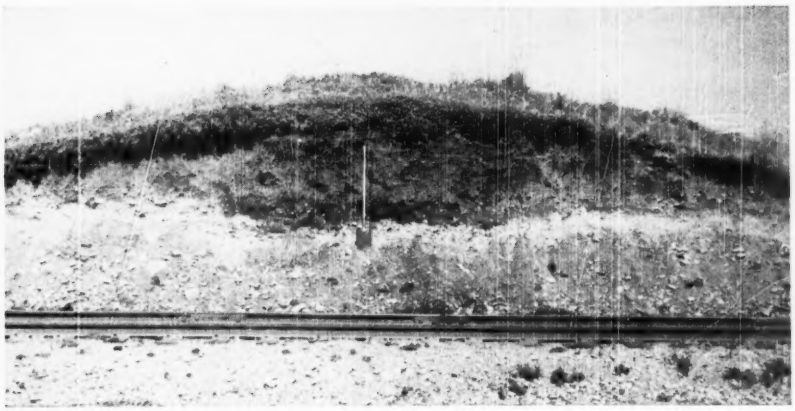
The local aspens are gone and the beavers have rafted trees from a considerable distance to build this dam.

This is a beaver "boneyard." Aspen branches, after the bark has been removed for food, have been pushed out by the beavers through a hole in the ice.

Miles from the nearest trees, in an area that does not seem to be "beaver country," the animals have established a sustained yield of willows.



On the Tenino Prairies, Washington, gophers have built great mounds of earth, which provide comfortable quarters throughout the year.



At a railroad cut, a gopher mound is sliced in half. The soil of the mound is finer than that of the surrounding prairie, and the vegetation growing on the mound is comparatively richer.

pine. And, finally, they may resort to cedar, spruce and even juniper, although how they are able to swallow juniper bark with any degree of relish is difficult to understand. When the last tree is gone, the animals begin patiently to cut willow whips, stripping the bark for food and working the peeled whips into the dam and the lodge, or storing bundles of whole branches under water for winter use when ice will cover the pond.

The beavers soon establish a condition of "sustained yield," the goal of the professional forester. The forester, we know, attempts to balance his annual harvest with the natural recruitment of the timber. The beavers move into a semi-arid valley where, perhaps, the stream formerly ran dry in August. It now begins to hold up throughout the year, and the channel becomes a series of small ponds connected by a slow flow of water. Moisture seeps up the banks and sub-irrigates the soil. Where willows were once represented by an isolated bush in a pothole here and there, they now flourish in a continuous fringe along the bank of the stream. And where a beaver-cut piece of willow, washed away from a dam at flood time, lodges in a mud bank it eventually sprouts and starts a new growth of willow. Judging from observations, a colony of beavers may establish such a relationship with the willow vegetation that, as fast as the bushes are consumed or destroyed, a like amount of new vegetation grows up to replace the loss. While no one would seriously suggest that the beaver "plans" the sustained yield program, the end result is the same.

If we look about us we can see other examples of mammals that unwittingly replace, to a greater or lesser extent, the plants upon which they depend for a living. In a sense they till and reap. Near my home town of Puyallup, Washington, is a striking example of the work of the pocket gopher in changing the face of the earth to his own design and needs. There, on the Tenino Prairies, the gophers have created what are probably the largest structures made by any mammal in the world. These are mounds of fine black earth, some of them containing fifty cubic yards and standing higher than a man's head. Similar mounds occur in all of the Pacific Coast States and in several Southwest States, but nowhere are they as spectacular as on the Tenino Prairies.

These mounds are formed under peculiar circum-

stances, not fully understood, where the top soil is thin or is subject to periodic flooding. By building a mound the gopher attains four benefits — a thick, protective covering over his nest; a not-too-dry home in summer; a not-too-wet home in winter; a garden patch. From an airplane I have noticed with interest the thousands of green oases that mark the mounds, as compared with the greenish-brown vegetation of the surrounding prairie.

From a study of the prairies in western Washington, treeless since the last Ice Age, we can deduce that the gophers have lived for countless generations in balance with the prairie vegetation. The gophers contribute to a sustained yield in two ways: First, by mounding the soil and creating a more favorable environment for the green plants upon which they feed; second, by storing underground, and failing to recover, plant roots, tubers, and bulbs, which subsequently sprout and help to regenerate the prairie vegetation. The gopher has a fur-lined fold in each cheek. These serve as pockets for the carrying of plant cuttings. When you walk over the territory of a gopher you may suddenly sink into a neat, round little chamber, four inches or more beneath the surface, containing a store of food. Suppose that the owner forgets the location of a cache, or suppose that he is surprised at the conclusion of his labor of thrift by a keen-nosed weasel or coyote! Then the cuttings may lie untouched in the ground until the appropriate season, when they will sprout into new plants to replace those the gopher has destroyed.

With the example of the beaver and the gopher in mind, one can think of other rodents that encourage, to a certain extent, the growth of vegetation. Among these are the tree squirrel and the ground squirrel, the pocket mouse, the harvest mouse, and the kangaroo rat. One can see how food caches of these animals, like the cuttings of the beaver and the gopher, may develop into islets of vegetation and contribute to the sustained yield of the area. Depending upon the species and the circumstances, the amount of vegetation produced by the animals may be less than, equal to, or greater than the amount which they consume or otherwise destroy. We know, of course, that the populations of some rodents, like the ground squirrel and gopher, may on farm lands require control by man. Nevertheless, plant eaters are not wholly destructive, but may, on the contrary, be credited with furnishing a portion of their own keep.

The Douglas squirrel is a famous harvester. In late summer and fall he works busily at cutting cones and gathering acorns, maple seed and berries. These he stores in a hollow log or in an underground cache.

Wasatch Mountains: Twilight

By JOHN GALLINARI WHIDDING

Like wrinkled women sitting still and straight
In purple gowns with snow-white lace jabots,
The ancient mountains through the dusk await
The wishing-star before their eyelids close.

Their kindly features furrowed by the sun
Of years long-sped, how calm a tryst they keep
As, heaven's watchlights twinkling one by one,
They nod in gloaming mist. . .and fall asleep.

Wit of A Wild Duck

By HUGH M. HALLIDAY

Photographs by the Author

At left is the black duck, motionless and camouflaged by debris in the pond. Search for the bird was almost abandoned before it was found. The bird remained motionless even when the concealing debris was removed by hand, revealing the duck as seen below.

When the old duck floundered off her nest into the pond, at the time of our first invasion of her privacy, her young were just hatching. On our second visit we had to part the cattails to get a view of the water, and to discover the family of black ducks, seven of them, now almost fully grown.

It was late June and warm, and my companion started to wade out into the pond. This was disturbing to the ducks and they crowded toward the deeper end. When he accidentally stepped into a hole, falling forward with a splash, the ducks dived. But only six of them reappeared. Of course we knew what had happened, the seventh duck was playing a trick familiar to old-time duck hunters.

We began a systematic search of the pond, but the missing duck was nowhere in evidence. We wondered, if it really was under water, how long it could remain there, and whether it had become a victim of strong protective instinct that held it beneath the surface until it had drowned.

There seemed to be no hope of finding the bird, and we were wading toward shore when an eye was spotted peering out from under some floating grass. The duck, in complete control of its buoyancy, was lying motionless with only its eyes and nostrils above the surface. Several times in our searching we had almost stepped on it or kicked it, and during the two or three minutes that we stood watching it the duck never as much as blinked.

Although this was a wild duck, it also held its motionless position while we removed with our hands the debris from across its eye and over its head. But a few seconds afterward it commenced slowly to sink. The duck drifted under water for several feet, then flashed into action. In a matter of seconds it was back swimming with the flock, having covered at least fifty yards in a straight line under water.

Arbutus

By LULU MINERVA SCHULTZ

And winter snows,
Like phantom Death,
Give way to Life
With Spring-time's breath —
Arbutus.

Tree Planting Program Pays Many Dividends

By RUSSELL F SCHLEICHER

A SCORE of years ago a young rural school teacher began a practice in conservation that has become a habit throughout his teaching experience. That first year he secured five hundred white pine seedlings from a forest nursery of his State, and, with the aid of a handful of upper grade pupils, planted the young pines on a bare hilltop near the school.

The rural teacher became a teaching principal in a small town, and his sixth grade pupils carried on the practice from year to year. Except for the war years, when trees were not available, and a year when the teacher was hospitalized, trees were planted somewhere each spring. One year it was some larches set out on a part of the country club grounds. Pines, spruces, firs and locusts were all tried in different years and on different locations.

The first planting is now a fine stand of tall, straight trees. The larches are like marching columns, pointing feathery tips toward the sky. One particular area planted with red pine included seventeen hundred seedlings. At present that hillside is beautiful with trees now about five feet tall and growing luxuriantly.

The present sixth grade was anxious to continue the tradition. To this end plans were laid in the fall. First there was a class discussion, after which the teacher had explained the obstacles to be overcome, and the joy of accomplishment to be attained. Among the obstacles considered by the class were selection of a suitable planting space, transportation to the chosen site, and the expense involved. The trees had to be purchased from a private nursery because of certain restrictions attached to products of the State nursery.

The teacher-conservationist inspects one of the trees in the plantation. Lower branches of the trees were removed as a sixth grade project.

One of the planting projects included red pines on a hillside. Now six years old, these trees are beginning to perform their task of checking erosion.

The pupils felt none of the hindrances were too big to overcome, and decided to go forward with the program. A bake sale was planned; seeds were secured to be sold at a profit. A play production to raise further funds was proposed if needed.

The mothers of the pupils were most generous in their contributions to the bake sale. The seeds arrived and were sold, and more funds were obtained. A few interested teacher friends gave contributions and the financial problem was solved. The dramatic offering did not prove to be necessary.

A busline ran out to the limits of a nearby village. By finding a farm within walking distance from this point the second obstacle, transportation, was solved.

The teacher approached the owner of a farm with some idle hillsides. This man, who was a rural mail carrier, a bank director and on the board of a rural telephone company, gave his cooperative consent.

The pupils wished to keep the interested parents informed. So composition and oral discussions were utilized in the class-rooms. Progress reports were written from time to time. Then the plans took specific form with the ordering of the young trees, following the planning for the kinds of trees to be ordered. A unit of work on lumber formed the basis upon which

A twenty-year-old plantation of white pine. This project started a series that has been carried on from year to year. Youngsters who took part are now adults and parents.

Before the planting program takes place instruction in the proper methods is provided. The young tree planters are shown how to spread out the roots in a generous trench.

the proper choice of variety was made. Evergreens prove to have a great appeal to most young people.

Before the actual planting day certain routine preparations were needed. The farmer plowed contour furrows along the hillside in parallel lines. This made planting much easier and assured better results. Trees had to be spaced equally in these furrows. So a plan was worked out to mark the planting spot for each tree. Some digging tools were required to loosen the soil and cover up roots, and pails to carry the seedlings and keep them moist. Some stakes were needed, as was twine to aid in the marking process.

One of the main needs was proper instruction on planting methods. This was provided by actual demonstration of the job at the planting time. Crews were organized for all the specialized tasks; diggers, planters, inspectors all coming along after the markers. With good planning and rotation of tasks the planting was done easily. Experience had shown that a well-organized crew could plant several hundred trees an hour if all the preliminary furrow plowing was ready.

Success in the plantations has been good, except in a few cases when an extraordinary dry period followed immediately after the planting. In the whole broad field of conservation such yearly projects as this may seem to play only a very small part. Yet these projects have stimulated, by practical experience, approximately seven hundred pupils. Many of these young tree planters are now the citizens and parents of the school community. Often they have expressed the opinion that the project in which they participated had great and lasting values.

The teacher feels somewhat like the poet who asked, "What Do We Plant When We Plant a Tree?" The answer to that query is not seen in the tangible things that the poet describes. Rather, it is in the ideals and ideas, taught in this practical way to the pupils who engaged in the projects, that the results are revealed. A rich memory of the planting day is retained in the minds of those who have gone before, and a lasting pride in the groups of trees now grown into beautiful, soil-conserving wood lots.

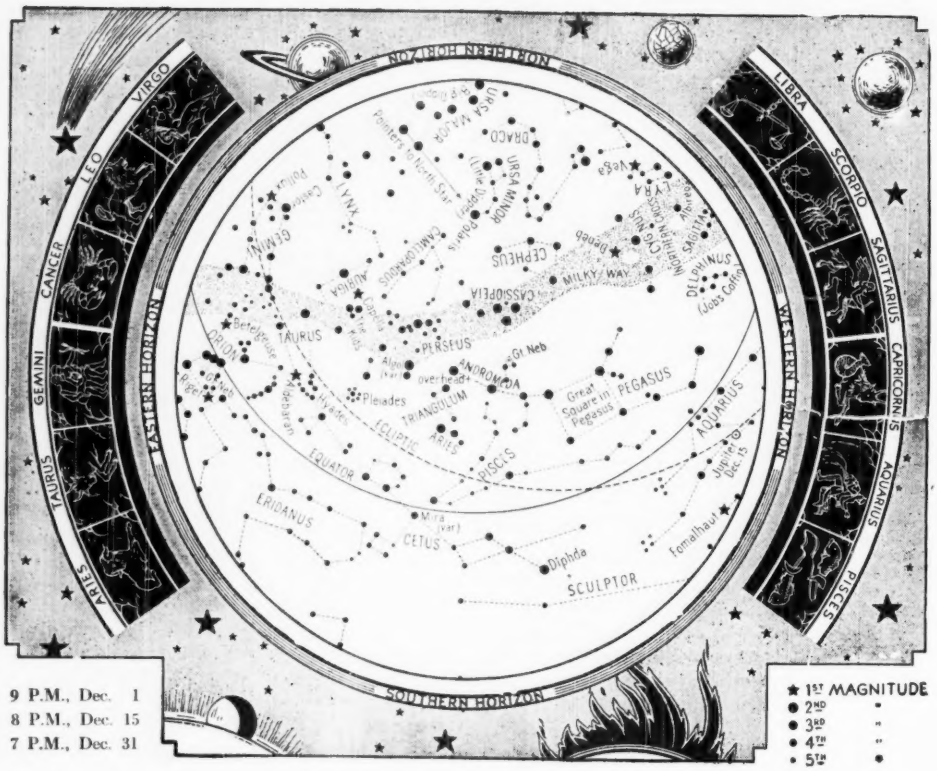
Trees Waiting

By MARGARET STOCKWELL TALBERT

The image of the bright-flushed summer dawn,
crowned with the *clustered*, serrate shapes of leaves,
outlined in living gold:
the stirring; the ripple, and the flow
of light, on the green, rustling tree
seem so long gone—
—as if they had not been.

Now there is but the weight of steely sky, laid low
upon the bent and brittle branch;
the thin, sharp, stinging cold. . .
No living sound; no glow—
trees holding the white burden of the snow.

One crisp and twisted leaf flicks stiffly now—
residual, upon a farthest twig; a sole,
late lingering leaf,
borne on the arching, meek, snow-laden bough,
stretched silent from the buffeted strong girth
of the tall bole. . .
bare trees, that speak the patience of the earth.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

The Brightness of the Stars

By ISABEL M. LEWIS

EVEN the most casual observer of the heavens will note a great difference in the apparent brightness of the stars. Centuries ago Ptolemy and Hipparchus divided all the stars visible to unaided vision — there were no telescopic stars to consider — into six classes. The twenty brightest stars were put in the class of first magnitude stars. The term magnitude referred to the brightness of the star, not to its size.

Nothing was known then of the stars as physical bodies, or that their distances from the earth differed enormously. There was, indeed, a general belief that the stars were all equally distant from the earth, scattered on a celestial sphere of great radius with its center at the earth. Stars such as Polaris and most of the Dipper stars were assigned to the second magnitude, followed by stars of third, fourth, and fifth magnitudes. Stars of the sixth magnitude were the faintest that the eye could see. On the scale adopted there was a difference of about two and one-half times in brightness for each change of one magnitude, and a difference of 100 times in brightness between a star of first magnitude and one of the sixth magnitude. This difference of two and one-half times in brightness between stars of adjacent magnitudes was extended to the fainter stars after the discovery of the telescope. The higher the number designating the magnitude, the fainter the star.

Observers sometimes differed considerably in their estimates of the brightness of a star. As there is no sudden change in brightness between stars of successive magnitudes, tenths and even hundredths of magnitudes were introduced to take care of the gradual change in brightness. It was a troublesome fact that the twenty brightest stars, put in the class of first magnitude stars,

stars, were by no means of the same brightness. There was, in fact, a difference of two full magnitudes between the least and greatest in brightness of these so-called first magnitude stars. It became necessary to introduce a zero magnitude to take care of such stars as Vega, Capella, and Arcturus. Stars in this class were approximately two and one-half times brighter than such stars as Aldebaran and Altair, which were nearly normal first magnitude stars.

Then, for stars even brighter, it became necessary to introduce minus magnitudes. Canopus was found to be of minus 0.9 magnitude, two and one-half times brighter than Vega or Capella. Sirius, brightest of all the stars, was found to be of minus 1.6 magnitude. Eventually an exact scale of magnitude was adopted, which, except for the first magnitude stars, made small changes, on the whole, in magnitudes already found. Necessary changes were made to place all stars on the same magnitude scale, which was proposed by the astronomer Pogson in 1850 and is now generally in use. The light-ratio, as it was called, or difference in brightness between adjacent magnitudes was 2.512, or the fifth root of 100; so that stars differing by five in magnitude differ 100 times in brightness. If there is a change of ten in magnitude there is a change of 100 times 100 or 10,000 in brightness. A star of zero magnitude is 100 times brighter than a star of fifth magnitude, and 10,000 times brighter than a star of tenth magnitude.

The faintest star that can be detected visually with the 100-inch Mt. Wilson reflector is of the 18½ magnitude. By means of long exposure on photographic plates with this telescope, stars down to the 21st magnitude can be recorded photographically. With the 200-inch Hale telescope on Palomar, stars can be observed photographically that are fully a magnitude fainter. A bluish-white star photographs strongly, and a red star poorly, on ordinary photographic plates. Corrections must be made for this difference in determining the magnitude of a star. The difference between the two, that is, photographic minus visual magnitude, is called the color index of the star. It is also a guide to the color of the star.

Accurate methods have been devised for determining the apparent brightness of stars relative to one another on this magnitude scale. It is possible to apply the same scale of brightness to the planets, the moon, sun, asteroids, satellites, novas and other celestial bodies. As applied to a newly discovered object, such as a nova, comet, or asteroid, it indicates whether the object is telescopic or visual, and whether it is within reach of small, moderate-sized telescopes, or only the most powerful. There is a limiting magnitude for telescopes of different sizes beyond which stars of fainter magnitudes will not be visible. The photographic limit with long exposures is, of course, higher than the visual limit. The visual limit for a two and one-half-inch telescope is about the 11th magnitude, and for a 10-inch telescope about the 14th magnitude. Pluto, which is of about the 14th visual magnitude, cannot be seen visually with telescopes less than 12 inches in aperture. It is easily visible in the 26-inch telescope in Washington, which shows stars visually to about the 16th magnitude.

The relative magnitudes of all the planets are given on the stellar magnitude scale. Jupiter, for instance, is of minus 2.6 magnitude at its maximum brightness; Venus is of minus 4.3 magnitude at time of greatest brilliancy. Mars varies greatly in brightness in different parts of its orbit. Nearest the earth at closest opposition, it is of minus 2.8 magnitude, surpassing Jupiter at its best, but when farthest from the earth under most unfavorable circumstances it is fainter than a star of third magnitude. Saturn is nearly a magnitude brighter when its rings are at their widest opening than when, as this year, they are nearly in line with the earth. In May of this year, when brightest, the magnitude of Saturn was 0.7 magnitude, brighter than Regulus and fainter than Vega. Uranus, at opposition, is barely visible without a telescope with a magnitude of 5.8. Neptune is visible in the smallest telescopes. Its magnitude at opposition this year was 7.7. On this same scale of stellar magnitudes the moon has a magnitude of minus 12.5 and the sun minus 26.7.

A most important use of this scale of relative brightness of the stars is for the comparison of the true luminosity of the stars at a standard distance when their distances from the earth are known. Since the apparent brightness of a star varies inversely as the square of its distance from the earth, it is possible to find out how bright a star is intrinsically, provided its actual distance from the earth can be found. The standard distance adopted for finding the absolute magnitude of a star, as its magnitude at this distance is called, is 32.6 light years. This is equal to ten parsecs, which is a convenient unit for measurement of stellar distances. One parsec, the distance at which a star has a *par*allax of one *sec*ond of arc, whence the name *parsec*, is equal to 3.26 light years. It is equal approximately to 19 million million miles. So far (Continued on page 552)

Ghost World

By MARCUS Z. LYTLE

Dead sister of our Earth, your ghost is left
to haunt the fringes of a passing cloud.
We wonder at your features, pocked and cleft,
Unsoftened by the mercy of a shroud.
Across your soundless night, a meteor track
Reveals the phantom of your atmosphere
Like ectoplasm seeping from a crack
Upon a mausoleum's chipped veneer.
— But Death, so frank to show a fleshless jaw,
Still turns our way the same unchanging face.
No man has ever walked on Earth who saw
The bony spine the Moon keeps turned to space.

Camera Trails

By
EDNA HOFFMAN EVANS

MERRY Christmas in advance, everybody! The shopping season is here again.

Because of the unsettled world conditions that began last summer, a number of people I know did a major portion of their Christmas shopping during July and August. But I certainly was not one of those before-handed individuals, and even now, with the days before Christmas getting fewer and fewer, my shopping has scarcely begun. Personally, I do not like to buy things so far in advance. If I have a present for somebody, I like to give it to him. Why hide it away for months so that nobody gets any enjoyment out of it? But that is personal opinion and beside the point. Let us go camera shopping.

It may not be quite so easy this year. Remembering the photographic shortages that developed during World War II, we may find recent events reflected on the shelves of camera stores. But, since film does become outdated, and since no one can use more than a moderate number of camera gadgets, the photographic stores did not feel the effects of scarce buying during the summer months as some of the grocery, dry goods, and automotive supply stores did.

Taken as a whole, the aspect is bright as we start on our annual Christmas camera-and-supply shopping spree.

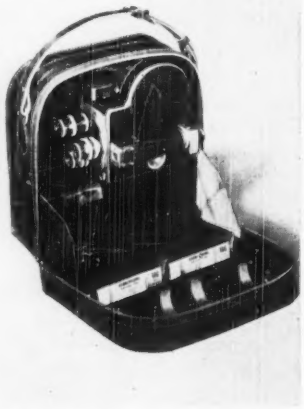
During the year there were a number of new cameras of both domestic and foreign manufacture offered for sale. "Camera Trails" mentioned them from time to time as they were announced. Then there are all the old standbys, too. All of them are possibilities as Christmas gifts and we can take our choice — box cameras, folding cameras, miniature cameras, big reflexes, press-type, movies or stills. They all have advantages and drawbacks.

Again may I repeat, as I do each year, that there is a point of diminishing returns when it comes to spending too little or too much for a camera. You can take pictures with a cheap dollar, ninety-eight camera, or even use a shoe box with a hunk of ordinary glass for a lens. But there are definite limitations to what such contraptions can do. If you want a good lens, fast shutter speed, and variation in focus, you will have to pay more. But, on the other hand, an amateur snapshooter need not be equipped like a professional unless he actually wants to do professional-quality work. There are enough cameras in the range from twenty to fifty dollars, and from fifty to a hundred, to satisy the aims and ambitions of most amateurs. More ambitious photographers can cross the hundred-dollar-mark and go on up.

As for the exact make and model — that question has to be answered separately for each individual. Know your prospective cameraman, his interests, capabilities, and ambitions, and buy accordingly. With youngsters, I would not recommend a too-expensive, too-delicate piece of equipment that he can "grow into" later. The chances are, he will either break the camera, or be so bewildered and discouraged by its intricacies that he will give up in disgust and never use it at all. Let a child and his camera grow together. That means changing cameras every so often, but it is better in the long run to do it that way.

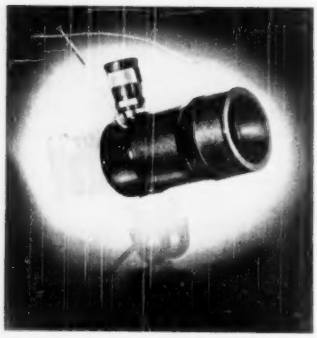
Among the new cameras not mentioned in this section before are three made by Eastman; there are two models of the Kodak Duaflex twin-lens camera, the difference being in the lens. The Kodak Duaflex II with a Kodet lens is priced at $13.95, and the Kodak Duaflex II with a Kodar f/8 lens is listed at $21.95. In the movie field Eastman has a new fixed-focus Cine-Kodak Magazine 8 camera that differs from previous models in that its finder is designed for use with a fixed-focus lens, plus an interchangeable telephoto lens for use on distant subjects. It is priced at $127.50.

The Eastman Kodak Duaflex II, a new model, twin-lens camera.



The II-2 zipper carrying case designed for Bolex movie cameras and accessories.

Makers of the Polaroid camera continue to sing its praises, and during the year a number of gadgets and attachments have been offered for it. Latest of these is a Polaroid master compartment carrying case to hold all the extra accessories that a picture-a-minute camera fan needs. The Polaroid camera has one advantage over other cameras for it develops and prints the picture immediately after the exposure is made. It is fine for the impatient cameraman. The trouble is, there can be no reprints because there is no



The Fototel, a telephoto device developed by a Dutch physicist, has an equivalent focal length of 18 inches.

This numbering kit is a handy device for users of cut film holders.

The Kodak Flashguard provides a protective shield for use in flash photography with either black-and-white film or color.

negative. You get one picture per shot and that is all.

In the realm of "dream cameras" for the outdoor fan is the new telephoto lens and sighting system developed by Hall-Barkan Instruments, Inc. The instrument pictured here was built for use with a Bell & Howell 16mm magazine camera. The model features a sighting lens that is

The Kalart Deluxe Compak speed flash can be used with many types of cameras.

matched to a taking lens, and both are coupled with respect to field and focus. The telephoto lens yields a 3½ magnification, while the gunstock mount (which is not a part of the camera) allows the photographer to follow his quarry with

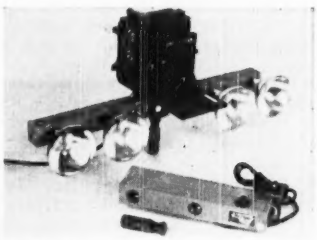
A "dream camera" with a matched sighting and telephoto lens, as well as a handy mount for use in following active camera subjects.

the greatest of ease. Inquiries about the device should be addressed to Hall-Barkan Instruments, Inc., 55 Columbus Avenue, Tuckahoe, N. Y.

Burke and James, Inc., also offer a telephoto lens, the Fototel, having an equivalent focal length of eighteen inches and an aperture of f/5.6, available for Leica, Kardon, Contax, and Kine Exacta cameras. The remarkable feature of this lens, which was developed by a Dutch physicist, is its size — the lens is just six inches long and it weighs two and a half pounds. The

This "safety first" Kalart concentrating reflector is used with midget flash bulbs, and even delivers uniform lighting when used with a wide angle lens.

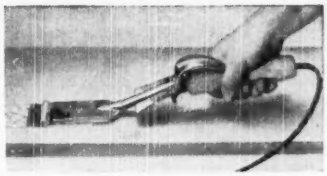
Fototel comes complete with reflex viewer, focusing magnifier, and three filters in a leather carrying case. Its price, however, moves it far beyond the reach of most of us, since it retails for $485. Complete details can be obtained from Burke & James, Inc., 321 South Wabash Avenue, Chicago 4, Ill.



The Fold-A-Light is designed to give plenty of light on any camera subject.

Again in the field of auxiliary lenses, this time for close-ups, the Tenplus Company, 43A Garden Drive, Roselle, New Jersey, offers a ten diopter slip-on lens for use in extreme close-up photography. It can be used in photog,aphing tiny flowers, parts of larger ones, lichens, mosses, insects and the like, at a four-inch distance from camera to subject. The lens comes in two sizes to fit a Series 5 and a Series 6

(Continued on page 550)



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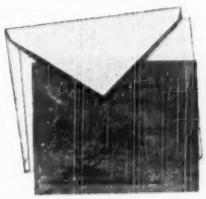

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The School Page

By E. LAURENCE PALMER

Professor of Nature and Science Education, Cornell University, and Director of Nature Education, The American Nature Association

CACHES AND MIDDENS

HIGH on a ridge near Kingston, Jamaica, our car pulled to a sudden stop when my wife gave the peremptory order that always stops us, "Wait, I see a shell." We climbed out lackadaisically. I picked up the geology hammer, and by the time I reached the scene of operations, enthusiasm was boiling high in at least a part of the family. True we had found some shells, but we had been finding them for weeks on the island, and for years elsewhere. But this time something was different. The shells were obviously marine, and we were a long long climb from the sea, but that was not all. We had found marine shells on the tops of high mountains, but nothing like these. Each of these shells had been broken. All of the shells in the bed were of substantial size — no little ones in the lot. So why all the excitement over a bunch of shells that formed a bed some feet in thickness and obviously extended over a considerable area. Why also was this bed buried under the usual duff of a forest floor and exposed only where the road had cut through it? Anyway what could we do about it since our boat was due to sail soon.

We had read of Morgan's pirates; had visited the hangouts of his gang of cut-throats. We had been warned by natives about the duppies that hid in the buttresses of the silk cotton trees. We had visited the neighborhood of the white witch, whose name was, unfortunately for us, Palmer. We had sought manatee in a shallow canoe that shipped sea water and almost ruined our cameras. We had taken the trail in the cockpit country, a route few white men were reported to have negotiated successfully because of the marksmanship of a bored colonist who had to amuse himself some way. We had seen all sorts of things, made all sorts of friends, some of whom we recently met again in Fiji. But of all these things we saw and all the experiences we had had, including some delightful gossip about the Barretts of Wimpole Street and tales of native morals, the one thing that sticks by us after more than a decade is the hour we spent beside that ancient midden heap near the top of a Jamaican mountain. If a vote of the family were to be taken as to where we would like to go and spend a few days when we retire I am sure that that midden heap would rank high among the leading choices. It is true that you feel more or less like a ghoul prowling around where other humans may have lived, even though you are prowling their garbage heaps. But garbage heaps have a significance, as you can note in any town by examining the garbage pails on garbage-collecting day.

Midden heaps also are worth looking at out in the wilds. The logs in my woodlot have cavities beneath them in which I find all sorts of things. This morning I turned one over and found a whole pile of shells of white-lipped land snails. Each shell had been broken and the contents withdrawn. Under the same log was a teacup-full of cherry pits, each of which had been broken into on one side. On top of the log there were some shucks from acorns, and at the base of a nearby tree, where gray squirrels nest, was a great mound of wings of tulip poplar fruits. Interestingly enough the wild midden heaps I looked at this morning were composed in each case of but one kind of thing. I am sure that the snailshell pile was made by some animal-eater, and the acorn pile by a plant-eater. The holes under the log were too small to permit the entrance of anything except mice and shrews, both of which are to be found in my woods. Now it is up to me to try to figure out which animal is responsible for which.

Just outside a pile of boards in my backyard is another little midden heap. This is not made of discarded, uneaten materials, but of the manure pellets that were left by a meadow mouse outside its hiding place. Somehow your respect for the lowly mouse goes up when you notice this evidence of a sanitary practice which, you know from observation, is not universal among all wild things, or, for that matter, with all human beings. Scatology, or the science of the study of scats or droppings or manure — whichever term you prefer — is woefully neglected in our work in biology. Yet it provides us with keys to more secrets of what is going on about us than almost any other thing. I enthuse over a pile of deer droppings in my woods, and rave against the human droppings in my woods left this morning by the workmen who are building an apartment nearby. One I like and the other sends me to my lawyer to get redress. I form judgments of both mice and men by their scatology. Even dogs and cats may attempt to bury their excreta.

Of course all accumulations of materials to be found in Nature are not wastes. While man accumulates potatoes, wheat, corn, eggs and butter, wild animals accumulate both plant and animal wealth for the day when it may not be too abundant. These caches may be taken in a way as evidences of thrift, or they may be little more than evidences of a well-developed acquisitive instinct, which calls for saving even when saving may not be necessary. The accumulation of surpluses naturally serves the interest of other organisms than those that labor and reap, and apparently the world of Nature matches the world of man when it comes to attaining freedom from compunction about taking from others what they may have earned by the sweat of their brows and the wit of their brains. Crows that eat grain stored by man, skunks that eat eggs laid by turtles, bears that eat honey accumulated by bees, deer that raid gardens tended by man are only a few examples of how one species, without consideration for another, may profit by the work of that other.

Since this is a school page let me suggest, for this month at least, that you make a reasonably serious study of midden heaps of all sorts, and caches of all sorts, to the end that you and your children may begin to learn from what you find. There is often a definite, recognizable relationship between what you see in a manure dropping and the food habits of the animal producing it. There are specific records left on gnawed nuts that help you identify the animal that may have been most intimately involved.

Once you have made some progress in identifying foods discarded or stored by provident animals, make another study to try to locate the original source of the material stored. If, at the foot of an oak tree, you find an accumulation of tulip poplar fruits, as I did this morning, then how far away is the tulip poplar that produced the fruits involved? This sort of thing can be done, even by those who could not identify the tulip poplar, since it merely involves matching what you find in one place with what may be found in another. If, then, you find a cache or midden heap, set out to map the territory that was involved in its production. That is one of the things that intrigued the Palmer family in the Jamaica midden heap. How did these marine shells get to the top of this mountain, and why were they taken there? Had the land risen, or were the shells carried up the mountain by primitive men? If they carried them up why did they do so? Was it healthier on top of the mountain, or were there enemies at the bottom? What was the story on our mountain, and what is the story in the cache or midden heap in your backyard? I will wager it is there.

This is the time of year when provident animals have built their stores to the maximum. Thanksgiving has just passed and the long winter is ahead. Watch how the animals that share with you your neighborhood manage to keep alive when the going gets tough. Last fall I had to destroy some boards in my back yard for wood for the fireplace, and to satisfy the wishes of the family, whose concept of neatness called for such sacrifice of wood and of my energy. I remember the great accumulation of unmutilated tulip poplar fruits that were found hidden beneath the boards I had to destroy. I am sure that I resented sacrificing this squirrel's storehouse more than I resented having to work on the woodpile. Maybe it is just a matter of viewpoint, and maybe it is something else. Possibly knowledge about what goes on in Nature conditions the willingness with which you do things that might conflict with the interests of other animals that you know work for a living. I wonder if it would not be a good thing for the whole world if midden heaps and caches had been studied seriously at some time during the public school experience. I hope you will want to do your part in enriching the background of your pupils along these lines.

MORE LETTERS IN THE "GOLDEN RULE" CONTEST

IN THE August-September issue of *Nature Magazine* we published five prize-winning comments in the so-called "Golden Rule for Wildlife" Contest inspired by Devereux Butcher's article in our March, 1950, issue. Readers have indicated an interest in reading more of these reactions to Mr. Butcher's thesis, so here are more of the entries that received honorable mention:

PUBLIC NEED BEFORE PRIVATE PRIVILEGE

By JOE M. HEISER, Jr.

THE urgent need of the times is for a policy to provide recreation next-to-Nature for all of our people, within easy reach, substantially unhampered, and obtainable the year round.

So-called game shooting is now available to an ever-decreasing minority, and is so limited in time and scope as to satisfy only a small part of their recreational needs. Wildlife authorities tell us this condition will grow progressively worse, as population increases and open land diminishes.

Clamorous over-emphasis upon the unsolvable problem of the game-taker has distracted attention from the real and vital issue. Satisfying outdoor activity; understanding of natural laws through direct, observant contact; non-exclusive fellowship afield; and the re-creating effect of earth, woods and waters upon body and spirit: These things can not be bought at the super-market, as can the "meat" which many gunners and their short-sighted commercial allies use as the basis of their claim for preferred consideration.

Let us by-pass the argument between the no-killing-at-all and the nothing-but-killing viewpoints, and concentrate, instead, upon a program of extensive wooded and waterside parks, and diversified co-operative and creative activities outdoors, to meet the needs of all of our people, every day, everywhere.

"IT JUST MAKES ME SICK"

By MARION W. COPELAND
(Age 14)

I'M SICK of hearing grown-ups say that teenagers are mean and irresponsible. They should talk! What could be meaner than shooting animals so that their heads can be hung on walls or their fur spread on floors.

In New Haven one night a lady talked on conservation. She had a mink coat on and I felt like asking her where the mink came from. I knew, they were slaughtered so that she, and other women, could be in the height of fashion. Wool is just as warm isn't it?

I agree with Mr. Butcher's article. This senseless slaughter of wildlife is ridiculous. Maybe my opinion doesn't count but to me just the thought of seeing an animal makes me happy, and when I think that people could enjoy killing those animals, well it just makes me sick.

I never realized that people would encourage youngsters to kill. I wonder how they would like to be trapped with a rifle pointed at them, to be shot and then run blindly for miles only to die and rot in a thicket.

The only things I've ever killed are flies. People have cursed me time and time again for rescuing mice and rabbits from cats, but I can't help it, I love animals and I can't see them suffer needlessly. I couldn't kill an animal if my life depended on it. I'll wager that if any of these so-called sportsmen would try they would see how wonderful animals are. There's one thing they should know and that is that, no matter what some people say, animals do have souls. They feel, love, and hate as vividly as any man. It is not the hide, horns, or antlers that makes animals beautiful, its the heart, courage, and faithfulness that make animals as beautiful and wonderful as God intended them to be.

THE GUN THAT JOHNNY GETS

By CAROL LEMS

LAST Christmas, as I was shopping, my attention was attracted to a father and adolescent son who were looking at guns. The whole situation was apparent at a glance. The father had the arrogant bearing of a person about to bestow a great honor; and the son, blushing and still baby-faced, was completely overwhelmed to think that he had finally grown up enough to own a weapon. It was an important moment in both of their lives. It was an important moment, also, to the security of hundreds of beautiful wild animals. The sight filled me with revulsion.

Today, when countless human beings are still suffering intensely from the cruelty of the last war, and others are planning the "War of all Wars," it hardly seems necessary that brutality be taught a child. If parents feel that the coming of manhood should be celebrated in a significant way, let them introduce their child to the beauty of all animals-even the common grass snake-, the remarkable harmony of social insects, the magnificent balance of Nature.

Undoubtedly, those who produced the film, "The Making of a Shooter," will argue, "Since people use guns anyway, why not teach them the correct way?" The first clause is the faulty one. Let the "makers-of-shooters" aim at the real solution, as Mr. Butcher puts it, the "crystallization of public thought" against lenient laws regarding the use of guns, and against the widespread practice of killing for fun.

I question Mr. Butcher's statement, "We are truly humane and Christian if we practice the golden rule. ." Love and

(Continued on page 551)

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JUST PASTE ON POSTCARD AND MAIL

CAMERA TRAILS

(Continued from page 547)

adapter ring. Both sizes are priced at $8.00.

Among the items of auxiliary equipment, always good as Christmas gifts, are a sizable number of new possibilities to choose from. In buying, one must be certain that the recipient actually has the equipment for which the auxiliaries are designed.

Anyone who owns either a Bolex H-16 or H-8 movie camera would be delighted to receive one of the combination leather carrying cases offered by Paillard Products, Inc., of 265 Madison Avenue, New York 16, N. Y. The H-1 case is London-made and designed for the Bolex H model camera, complete with three lenses, three 100-foot cartons of film, exposure meter and accessories. The H-2 zipper carrying case is American-made with fitted compartments for exposure meter, two 100-foot cartons of film, and accessories. The former sells for $45.00 and the latter for $30.00.

In the field of auxiliary lighting aides, there are a number of actual lights and gadgets for lights.

The Kalart Company, Plainville, Conn., has a new concentrating reflector with "safety first" features, designed for midget flash bulbs and retailing at $5.85. It can be used even with a wide angle lens. The same safety first features are included in the Deluxe Compak flash synchronizer offered by Kalart at a price that varies, depending on the camera. Thus, whether you are interested in just the reflector, or in the entire flash synchronizer, Kalart can supply your wants.

Eastman has a series of flash gadgets, the Kodak Flasholder model B (price $11.50), the Kodak Flasholder extension unit model B ($12.75), and the Kodak two-way Flashguard (55c). The Flashguard is made of plastic and designed to slip over standard Kodak flash units. It is two-way in that one side of the guard is clear, for use facing the subject when regular flash lighting effects are desired, and the other side is diffuse, or matte, intended for use in facing the subject when softer lighting effects, as in close-up portraits, are desired.

For greater light on the subject, there is a Fold-A-Light, made for Penn Camera, 126 West 32nd Street, New York City, and attachable to any movie or still camera. This set-up can be handheld, attached to a tripod, or set on a separate stand. It retails at $9.95.

As for assorted gadgets, Eastman has two. The first is a special cloud filter (price $1.95); it is deep yellow and designed to fit practically all inexpensive cameras. It brings out clouds, emphasizes light-colored subjects in marine scenes, and also will reduce blue aerial haze in landscape photography. The other Eastman product is the pint-sized Kodak ektachrome processing kit (price $1.50) designed for both amateur and professional photographers who wish to process rolls of either 120 or 620 Kodak Ektachrome film. The 16-ounce kit is sufficient for two rolls of film.

For photographers using cut film holders, Alkon Photo Products has a numbering kit — a set of plastic tabs — to help the cameraman keep track of his data and identify his films. This is especially handy when a cameraman is shooting fast and in quantity, and when he may want to develop a particular film without processing all of them. Each kit contains twenty-four numbers and sells for 50c. The company that makes them is located at 230 East 124th Street, New York 35, N. Y.

In the field of exposure, a dollar will buy a pocket-size, booklet-form Photographic Exposure Computer, which works for either color or black-and-white film. It includes a dial calculator for determining shutter speed and lens stop, and also tells what allowances to make for distance of the scene, altitude of the sun by latitude, date and hour, clouds and other atmospheric conditions, shade and direction of lighting, and film speed. In fact, it seems as though you could almost navigate an airplane by it. The computer can be obtained from the American Standards Association, 70 East 45th Street, New York 17, N. Y.

In writing for any of the above mentioned information or products, please mention "Camera Trails."

In conclusion, let me repeat that there are many, many older models and gadgets that will make excellent Christmas gifts. There are other new ones, too, but space does not permit inclusion of all the new accessories and photographic do-jiggers. Try to make the gifts you select usable by the person who receives them. Keep his needs, his style of equipment, his likes, and his personality in mind while you shop.

And now once again — happy Christmas shopping!

"Yank"

"Yank" is an emperor eagle who was once owned by General Dwight Eisenhower, and has now found a permanent roost at the Rheinmain Airport, where he vies with big trans-Atlantic airliners. The king of the air is now fifteen years old, and hails from the High Tatra Mountains of Czechoslovakia, where he was captured by German soldiers during the war. Tamed, he was adopted by the American Red Cross, which presented the bird to the General. "Yank" has since made a world tour with his trainer, Frank Wedde. The bird, whose wing-spread is seven feet, poses beside an American Overseas Airlines plane.

Under A Lens

Activities of the minute are usually unobserved but ever fascinating. Recently we received a letter from Edward Lindeman of New York City who reports such an observation, although, unfortunately, cannot tell us what insect he was watching. He writes:

"I have just been observing a small, light-green slender insect about 8 mm. long, through a lens. Out of curiosity I concentrated the light of the lamp on him through the lens, and then rapidly shifted the lens back and forth so as to bring him alternately into bright light and then into the shadow of my hand. Invariably (with an exception) this stimulus started him rapidly to cleaning his front legs and antennae; blinking a flashlight on and off rapidly had the same effect. I made the test some twenty times, always with the same result. At one point, after about ten or twelve tests, he acted tired and confused and didn't respond for a while. After a rest he began responding again to the test. I had the feeling that his tired period probably corresponded (on his own level) to the artificial neurosis produced in laboratory animals.

"In the last part of the tests he began cleaning his wings instead of legs and antennas when the light flashes started. All of these motions were of a mechanical, automatic nature; after I was finished testing and he had rested about five minutes he cleaned his wings in a deliberate 'intelligent' manner, as if he were selecting his actions — lifting his abdomen and his wings, which he had not done during the cleaning stimulated by the flashes.

"It should be interesting for readers to make similar experiments on insects that come their way. Perhaps such reactions are known to entomologists, but they were new to me."

The Raccoon

Masked Prowler. By John and Jean George. New York. 1950. E. P. Dutton and Co. 183 pages. Illustrated by Jean George. $2.50.

This is the latest addition to the growing list of animal books by this husband and wife writing team, the previous books having dealt with the red fox and the mink. The authors know the outdoors and love and understand its creatures, so their stories of animal heroes are told with a warmth and tenderness into which is woven natural history fact.

"GOLDEN RULE" CONTEST

(Continued from page 549)

protection of wild animals is a moral code to be found in many cultures and religions the world over. In fact, western civilization is one of the very few which tolerates slaughter only for "sport."

HUNTING THE GOLDEN RULE

By ROLAND C. CLEMENT

THIS is no defense of hunters, too many of whom, God knows, are unthinking in their pursuit of recreation, but Devereux Butcher overstates our case when he accuses hunters of exterminating forty species of wildlife. Let's stick to the facts — we have enough of them. Private interest and plain irreverent blundering, not "sport," snuffed out several species; habitat destruction accounted for more, and will continue to exterminate others unless we get together and set this conservation movement on the solid ground of basic issues.

Why become incensed over the immorality of the sporting fraternity when the real issue is a lack of cosmic piety in our whole civilization? I agree with Mr. Butcher, but we need to go deeper, since these things will not be decided by our respective minority groups. If practicality forces us to focus our energy and to take a step at a time let's begin by helping to introduce ethics in this pastime; we can hardly expect moral issues to gain consideration among those who lack even the rudiments of ethics.

I agree, also, that there are too many nimrods, but this is a result of too many people. We are in an era of mass hunting, and our present problems are as nothing compared to those of the future if we don't all agree on some sort of optimum population for this nation and the world. Conservation, for those who are willing to give it more than emotional endorsement, is a parting of the ways; anything less than an integrated effort is merely putting off the day of reckoning.

Cats

Cats of Destiny. By Fairfax Downey. New York. 1950. Charles Scribner's Sons. 170 pages. Illustrations by Paul Brown. $2.50.

This is the story of famous cats, starting with the Mau, Egypt's sacred feline, and including such famous cats as that which belong to Dick Whittington; Dr. Johnson's famous pet, Hodge, Madame Théophile, the French novelist Gautier's feline companion; Mike, the British Museum's unofficial feline curator, and Chessie, the Chesapeake and Ohio Railroad's famous trademark. All cat lovers will revel in this collection of famous felines, and will find this an ideal gift for a cat-loving friend.

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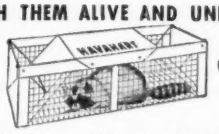

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THE BRIGHTNESS OF THE STARS

(Continued from page 545)

as is known no star lies within this distance of the earth.

The brilliant double star, Alpha Centauri, at a distance of 4.3 light years, is the nearest known star to the earth. At standard distance of 32.6 light years the sun would be visible without aid of the telescope as a star of fifth magnitude, 4.8 magnitude to be more exact. Beyond a distance of about 50 light years our sun could not be seen without a telescope. Even with the aid of the 100-inch telescope it would be impossible to see it at a distance of about 33,000 light years. This distance is less than a third of the probable extent of our stellar system, or galaxy, so beyond this distance from the earth, even in our own galaxy, there may be countless stars of about the same luminosity as our own sun that cannot be detected with the most powerful telescopes in existence. The sun is an average-sized star. There are supergiant stars that exceed it more than 10,000 times in luminosity; other giant stars that are 100, or even several hundred, times more brilliant than the sun. And there are dwarf stars that have less than a hundredth, a thousandth or even a ten thousandth of the luminosity of our sun. The faintest dwarf star known is at a distance of 19 light years and is 1/575,000 as bright as the sun. Only supergiant or giant stars can be seen telescopically in the Great Andromeda nebula, 900,000 light years away. In some more distant spiral nebulas only supergiants can be seen with the most powerful telescopes, and then not beyond distances of several million light years.

There are in the heavens about 155 stars of 3.0 apparent magnitude or brighter. About three out of every five of them exceed our own sun in true luminosity by 100 times or more. The only one of them that is close to our own sun in absolute brightness is Alpha Centauri. Its absolute magnitude is 4.5 as compared to 4.8 for the sun. Supergiants among these stars are Canopus, Deneb in Cygnus, Beta in the Southern Cross, Rigel and Betelgeuse in Orion. Most of these are more than 10,000 times brighter than the sun. Canopus the most distant of all these stars is 1630 light years from the earth. It has the greatest absolute magnitude of all of them—minus 7.4. Deneb is a close second with minus 7.2. Both of these would outshine Venus more than 15 times at a distance of 33 light years. Among these 155 stars are also such giant stars as Polaris, the three stars in the Belt of Orion—Capella, Spica and Aldebaran. Although Sirius surpasses all stars in apparent brightness, it is only about 25 times more luminous than the sun. It is only 8 light years from the earth, so drops to a star of less than first magnitude at standard distance. It is not one of the giant stars.

Mercury is an evening star in December, and at greatest eastern elongation on December 15; but even then is difficult to observe low in the southwest at sunset. Venus is also an evening star, but low in the west all the month. Mars is still visible in the southwest after sunset. It is decreasing steadily in brightness. Jupiter is conspicuous in the southwest in the evening hours. It is due south shortly after sunset. Saturn is now a morning star in Virgo rising about midnight.

Winter will begin in the northern hemisphere on December 22, at 5:00 A.M., Eastern Time, when the sun is farthest south of the equator.

PUZZLING SAND FORMATIONS

By GLENN S. DOWNING

THE peculiar sand formations shown in the accompanying photograph were first brought to my attention when two boys were playing in the sand along the shore of Lake Huron near East Tawas, Michigan. As the boys pulled handfulls of sand down the slope these formations were uncovered. They varied in size from about four inches to a foot or more in height. At first glance one is led to believe that there is clay to hold the sand particles together, but on exposure to the sun and air the formations soon crumble to sand.

How these peculiar sand sculptures were formed is somewhat of a mystery. A geologist has stated that they may be sand concentrates in a worm burrow that filled with water, but are not the more common accretions of sand around rootlets. Such formations, according to the geologist, have been found in highly compacted, indurated sands that are becoming rock, that is, a hard, stratified sandstone which was originally sand like that along the shores of Lake Huron.

PRAIRIE POTATO

By A. C. ELLERMAN

NATURE provides various wild foods, and one of these is a much prized Indian food of the prairie states. Pioneers knew this food as *pome de prairie*, prairie potato. Its chief habitat is in the virgin meadows and hilltops where it has not been disturbed by the encroachment of modern cultivation.

The plant is easily identified by its gray foliage, oval flower and seed heads, and grows stockily, like a miniature tree, to a height of ten or twelve inches. Anchored below ground is a black root resembling the black Spanish winter radish. During the early days of pioneering this root crop was prized by many as a winter food supply, especially so by the American Indian, who, to this date, make yearly pilgrimages to natural sites in quest of this food. Known to the Indian as Teepsna, it is eagerly sought during the late summer and early fall months. It is not uncommon during these months to see large assemblies of squaws gathering this prairie fruit and braiding the roots for drying and winter use. When needed, these roots are sliced and cooked with grains and meats.

To the early rancher, sheepmen and hunters the wild plant held its place as an emergency satisfaction of hunger. The march of progress and the expansion of cultivation has eradicated many of the areas in which this food crop once thrived, and it is becoming more and more limited.

Legend has it that this food crop contributed much toward longevity among early tribes. When one root is found others cluster nearby and can be easily found. To be tasty, the tubers should be dug when young and can then be eaten in the raw stage. When permitted to grow large, to the size of an egg, cooking is necessary, and only an Indian knows the secrets of their processing. Many tourists who have acquainted themselves with this food take time out to seek it.

THE READER'S MARKET

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UNDER THE MICROSCOPE

By JULIAN D CORRINGTON

MOSSES
II. Sporophyte

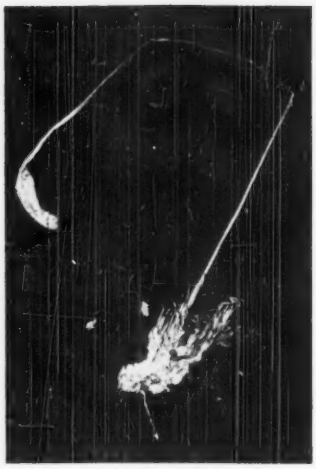
IN THE November issue we described the first half of the moss life cycle, taking up the gametophyte generation, and ending with fertilization of the egg, an act producing the *zygote* (Gk., yoked, referring to union of sperm and egg). This marks the beginning of the *sporophyte* generation — that one in which reproduction is asexual, developing spores.

Recall that the egg cell lies in the venter of the archegonium, and there it is fertilized, and begins a series of cell divisions that mark it now as an *embyro*. Soon this developing sporophyte has outgrown its narrow confines in archegonial tissues, digests its way down into the leafy stem, and proceeds to draw on its female parent plant for water and minerals and a certain amount of organic food. Its relations are therefore those of a parasite.

Meanwhile, the other end proceeds to grow upward, and is shortly to be differentiated into three main portions: The *foot* is that part which grows down into the parent stem, serving the sporophyte as a root; the *stalk* or *seta*, very short in some species, several inches long in others, is a slender, stem-like structure without leaves, usually brown in color; and the *capsule*, a complex spore case at the tip of the seta. As the sporophyte elongates upward, most of the old archegonium is torn off and rides up on top of the developing capsule as a cowl-like covering, the *calyptra* (Gk., a headdress). It is usually not shed for some time. In an accompanying illustration, the sporophyte is seen protruding from an old archegonium which is one of a cluster terminating part of a gametophyte. The seta has been bent twice so as to bring the capsule into the picture. The calyptra has been shed, exposing the so-called teeth.

Within a young capsule is a central core of sterile tissue, and surrounding this a cylinder of *spore mother cells*. Beyond these, in an outer cylinder, are other sterile cells containing chloroplasts, the extent of which varies. The sporophyte in most moss species is green here and there, or at times, and can manufacture some of its food; it is parasitic, but usually not entirely so. The longitudinal section of a capsule shown in one of this month's photomicrographs is cut at one side of the central core, and shows a great many spore mother cells.

With further development, the spore mother cells divide twice, producing a tetrad of *spores*. A lid or *operculum* has been forming at the upper end of the capsule,



Moss Sporophyte growing out of Gametophyte, 10 X.

and, when mature, falls off. First the calyptra, then the operculum, fall off and remove protection from the great mass of spores within, like removing first the lead foil, then the cork, from the mouth of a bottle.

A valvular device generally remains, however, allowing spores to issue only under suitable conditions, and we might compare this to a patented pouring nozzle that can be inserted in a bottle mouth. This apparatus takes the form of *plates* or *teeth*, the latter collectively making up a *peristome* (around-mouth), and either 4, 8, 16, 32, or 64 in number. The teeth are strongly hygroscopic, meaning that they react markedly to variation in moisture content of the atmosphere; to humidity. In damp weather, the teeth expand, pointing inward and acting as a closed door; in dry weather they curl up outwardly, opening the door so that dry, mature spores may escape and be blown about by the wind, the method of dissemination of the species. Falling upon favorable surroundings, a spore may germinate to form a protonema, completing the cycle.

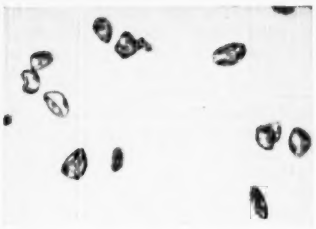
In these brief descriptions it should be noted that there is an obligatory *alternation of generations*. The only way a sporophyte can come into existence is from a fertilized egg; this plant cannot reproduce sexually, but only asexually, by cell division of embryonic and later spore mother cells; a spore cannot develop into a sporophyte, but can only give rise to the gametophyte generation, which propagates sexually. The plant known to the public as a "moss plant" is the gametophyte, whereas the conspicuous and leafy fern plant is the sporophyte; mosses are the highest plants in which the gametophyte is the dominant generation. In mosses the sporophyte is parasitic and dependent; in ferns it becomes free and independent.

We have not touched on the subject of chromosome reduction in this cycle as yet, but should append a word in that regard for those readers who would be interested. The gametophyte cells have single sets of chromosomes, or are monoploid (haploid), including the final cells of this generation, the sperm and egg. Fertilization brings two sets together in one cell, the zygote, and hence all sporophyte cells are diploid. Reduction occurs during sporogenesis, the mature spores being again monoploid. This sequence is characteristic of plants and marks one of the more important differences between multicellular plants and animals; plants undergo reduction during sporogenesis, animals (lacking a spore-producing generation) during gametogenesis.

Look for mature moss plants bearing sporophytes with capsules in the spring or early summer in some species, in the fall in others, in which case they winter over. In a few, the sporophyte endures for a year or more, and there are even species in which no sporophytes have ever been found.

Slide preparations of the sporophyte generation include: a longisection through the archegonial head to show the embryo sporophyte growing in the old venter, or the later foot; cross section of the seta; and various sections and whole mounts of the capsule and its parts. Of chief interest in capsule preparations would be a

Capsule, l.s., 30X.



Fresh spores, 720X.

comparative series to show type of calyptras, operculums, and peristomes. Cytological slides would include thin sections of developing capsules to demonstrate meiosis in the two divisions of the spore mother cells. The spores make interesting whole mounts, and may also be sown on soil so as to germinate protonema.

BIOCENTENNIALS
René Descartes, 1596-1650

IN HIS youth your grandfather probably played with a Cartesian diver, also called a Cartesian imp or devil — a cylinder filled with water containing a hollow glass object, usually a little image in the form of His Satanic Majesty. Enough air was left inside Mephisto so that he would just float at the surface. Across the top of the cylinder was a rubber membrane, pressure upon which forced water into the imp, causing it to sink. Releasing the pressure, the diver would rise to the surface, or could be held at any desired depth. Anyone may make their own Cartesian devil by inverting a testtube in a cylinder of water, adjusting the amount of air allowed to remain in the tube until it barely floats. A toy balloon will provide the rubber membrane, and lo!, you are back in the great Seventeenth Century, fascinated, with Descartes, over problems of buoyances and pressures in liquids.

Three hundred years ago, at the height of the upsurge of human mental freedom, the frail body that housed one of the great minds of all time passed away in Stockholm. Vast indeed were the achievements of those whose life dates were overlapped by the French philosopher and mathematician, René Descartes, known also under the Latin form of his name, Renatus Cartesius. Shakespeare and Milton, Rubens and Rembrandt, the defeat of the Spanish Armada and the founding of Harvard College, were contemporaneous with Descartes. In his own sphere, the illustrious names are too numerous to mention, but some of the brightest luminaries of this great Elizabethan era were Galileo, founder of the experimental method, Bruno (philosophy), Gilbert (magnetism), William Harvey (circulation of the blood), Tycho Brahe the astronomer, the physicist Torricelli (barometer), and the mathematicians Kepler, Snell, Pascal, and Fermat. In his later years he could have known certain youths over whose heads were some of the most brilliant stars of destiny the world has yet seen — Dr. Sydenham, Robert Boyle and his assistant Robert Hooke, Spinoza, Sir Christopher Wren; the three great pioneer microscopists, Malpighi, Swammerdam, and Leeuwenhoek; and that supertriumvirate of genius—Newton, Huygens, and Leibniz.

What an age in which to rise to fame, amid such competition! But in spite of this overpowering assemblage of cerebral giants, there were two men who were thinkers rather than doers, and whose writings had such tremendous influence as to set the pace for all others; two men generally accredited with bringing on the modern era of science. One of these was Sir Francis Bacon (1560-1626), Baron of Verulam, and Lord Chancellor of England; the other was René Descartes.

Without entering into a discussion of the relative worth of a doer like Huygens and a thinker such as Descartes, it may be remarked that both have their value to humanity. There is no record that Descartes could ever experiment or invent or discover in the physical sense. Of him it probably could have been said what the great English physician and physiologist, William Harvey, remarked of Bacon — "the Lord Chancellor writes of science like — a Lord Chancellor." Yet there are inventions of the mind and discoveries in the world of abstractions that may be no less important than corporeal ones. Descartes, due to lack of robust health, practiced an unusual form of exercise every morning, mental exercise in bed before arising for the day! No one could have known it at the time, but it was certainly a most eventful morning for the human species when Descartes, lying in bed and thinking and planning, discovered a way to unite geometry and algebra. The result we term today coordinate geometry or analytical geometry or simply analytics. In its simplest form, this wedding of the two branches of mathematics is seen daily in every curve and graph, entering into all forms of statistical studies. Algebraic equations can be set up to define a curve, and curves can be drawn to depict an equation. This invention marks the beginning of modern mathematical science, and has been of inestimable value, both theoretical and practical, in physics, engineering, optics, and many other fields.

Descartes was born at La Haye, in Touraine, March 31, 1596. Many members of both sides of his family were physicians, noblemen, and men of learning, and at an early age René displayed signs of his coming greatness. His father used to call him "the little philosopher." After eight years in school, where he mastered his studies with ease, especially mathematics, he graduated in law at the University of Potiers, in 1616, then decided he should choose a military career, so took up riding and fencing. He went to Holland for a year in 1618 as a gentleman volunteer, but there is no evidence that he ever did any real soldiering. Then began a series of travels all over Europe, in which he wandered from place to place,

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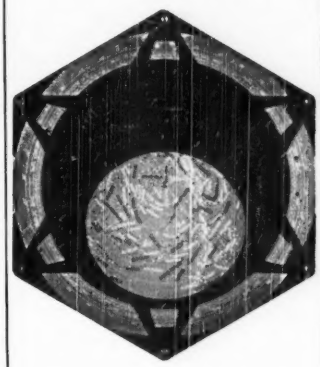

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now in a quasi-military capacity, again as a mathematician. In Paris, he did some work on optics. Finally, in 1628, having decided he had seen enough of the world and its bustle and strife, he sold his estates, invested the proceeds, and settled in Holland in order to work on a number of proposed books and papers. He lived all over Holland from time to time, now in a city, now in the country. There is a letter of his to Balzac in 1631 describing the delights of life in Amsterdam. In 1649, after 21 years among the Dutch, he was persuaded to dwell at the court of Sweden and instruct Queen Christina. But the climate and the Queen's lesson-hour, which was five A.M., proved too much for Descartes, and he sickened and died there in 1650.

His works are voluminous and include many subjects. Chief among these are mathematics (*Geometry*, 1637), philosophy (*Principles of Philosophy*, 1644), physiology (*L'Homme*, 1662, posthumous, said to be the first textbook of physiology), physics (*Le Monde*, 1633), optics (*Dioptric*, 1636) and also in the work on philosophy, and many others. Most famous is *Discours de la Méthode pour bien conduire sa raison et chercher la vérité dans les sciences*, translated as *Discourse on the Method of Good Reasoning and of Seeking Truth in Science*, commonly shortened to *Discourse on Method*, published in 1637.

Descartes believed that the Diety endowed Nature with all of the natural laws that man discovers, and therefore these laws must be perfect and immutable, for he was a devout Catholic and all of his philosophy is made to conform. But he would turn around and become a detached, abstract scientist in his thinking, and seemed to have no difficulty in living this intellectually dual existence. He explains human functions, for example, on the basis of a machine driven by a rational soul as the operator, and is the first to write a mechanistic physiology. In optics, he was the first to publish the vastly important sine law of refraction, though this had been worked out earlier by Snell but not published. Some modern critics think Descartes plagiarized Snell, others that he did not know of the earlier work but made the same discovery independently.

The great Frenchman was wrong in one argument of the day when he stated his belief in the instantaneous passage of light, but he was the first to present a workable theory of the rainbow, a complex optical problem that had baffled men for centuries. His Cartesian ovals are celebrated in dioptrics, and he believed it would be possible to construct completely achromatic lenses on hyperbolic or elliptic curves, just as he conceived an "ideal microscope," though none of these were ever actually manufactured. His followers developed Cartesian philosophy into the doctrine of Occasionalism, or occasional causes; that the soul and body are incapable of interaction except upon occasional direct intervention of the Diety.

Descartes was primarily interested in the development of the best method for the study of science. Since mathematics was the perfect science, he tried to apply the method of mathematics to all other fields of human endeavor. He was highly dissatisfied with the prevailing Aristotelian scholasticism, or reliance on authority, and succeded in abolishing this medieval attitude in favor of a mechanistic approach. Man's body was like that of animals, he said, but the human soul was distinctive and the mind can work independently of the brain. Thus, he emphasizes again and again, the duality and cleavage between mind and matter. He is considered the father of modern philosophy as well of mathematics.

Descartes and Bacon instigated a complete revolution in human thought, and as they recede into the past with the lapse of time, their stature will grow, whereas that of someone who was merely an inventor will diminish as his products become obsolete. In the jargon of today's college student, both of these men were great "brains," with enormous analytical and synthetical powers in abstract thinking. We may well hope that, before it is over, the Twentieth Century will produce a galaxy of geniuses equal to those of the fabulous Seventeenth.

SONGS FOR THE COMPARATIVE ANATOMY LABORATORY

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Dearie, do you recall how Owen
Claimed that our bony domes
Came from our sclerotomes?
Gaskell derived our gang from spiders,
Dohrn turned the worm belly-high
(Such a theory!)
And Dearie, your arm is just a gill bar
If you follow Gegenbaur
Teleology in flower:
Dearie, do you weary
Of morphologies gone by?
Do you believe them?
Yes, I believe them!
Then Dearie, you're much dumber than I.

PHYSICS

A PHYSICS textbook can be dull or inspiring, according to organization, presentation, and illustration. Our opinion of the second edition of *Introduction to Physics*, by Harley Howe, Cornell, rates this book very highly on all three counts. The line drawings are exceptionally clear, numerous, well chosen; the photographs, the plan, and format all excellent; but outstanding is the author's use of the scientific method, reasoning from cause to effect, from known to unknown, drawing on everyday experiences, banishing popular misconceptions and half-baked ideas, and stress of summaries, problems, and self-questioning. The point of approach is a "common sense" one, but the common sense must conform with scientific reality.

The first fourteen chapters deal with mechanics in a way certain to appeal to the college student of today, relating facts and principles to modern living. This sets the pace for the sections dealing with sound, heat, electricity, magnetism, and light. There is ample coverage of nuclear physics for an introductory work, and throughout the emphasis is on principles rather than on mathematical formulae. The fundamental equations are there, but they don't run away with the book. Pp. xii, 599; figs. 512. McGraw-Hill Book Co., Inc., 330 W. 42d St., New York 18, 1948. $4.50.

REVIEW

THOSE who have tried to introduce new materials, methods, or procedures in the teaching of sacrosanct courses in the college curriculum have discovered the conservatism of teachers and the difficulty of changing the established order. We much admire the courage of Dr. Florence Moog, Washington University, St. Louis, in spreading the gospel and providing an essential item to motivate a needed reform. She is the author of *Structure and Development of the Vertebrates*, "a manual for an integrated course in comparative anatomy and embryology." The plan has been under trial at her home institution and has met with such success as to insure permanent adoption there.

Teachers of either subject are well aware of the necessity of introducing considerable material from the other;—it is one of those cases where a student shouldn't have anatomy until he has had embryology, and shouldn't take embryology until he has completed anatomy. Every writer of a text of comparative anatomy feels the need of introducing one or more chapters on development, essential to explain homologies and phylogeny, yet the detailed analysis of chick and pig embryos, the type of information needed, is not forthcoming until a later separate course, which many students do not take. When the two subjects are given separately, there is necessarily much repetition and lack of proper integration.

Dr. Moog has, in our opinion, solved the problem admirably. Her manual is intended to be used with standard texts in both subjects, for a year course, and for the most part is strictly a book of laboratory instructions. Yet the author has felt a lack in available texts of sufficient emphasis on two of the great guiding principles of morphology — homology and recapitulation — and so has written a textual chapter to fill this need: it wins our vote as excellent and necessary.

We hope this book will meet with the success it deserves, will stimulate adoption of the proposed reform, that registrars will not throw blocks at it by claiming the allocation and transfer of credits too difficult, and that medical schools will shortly require some such integrated course as this for entrance. The idea, the authorship, and the presentation are all excellent. Pp. xiv, 170; figs 76. Prentice-Hall, Inc., 70 Fifth Ave., N. Y. 11, 1949. $3.50.

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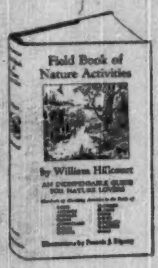

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